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**ANTHROPOLOGICAL PAPERS**  
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**CONTRIBUTIONS TO THE ARCHAEOLOGY OF MAMMOTH CAVE  
AND VICINITY, KENTUCKY**

**BY**

**N. C. NELSON**



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By N. C. NELSON.





## PREFACE.

Cave archaeology has many incentives in America. In the first place, this line of research has yielded unprecedented results in Europe and some of the Old World investigators still persist in arguing that application on our part would duplicate their own achievements. In the second place, we possess an abundance of caverns and rock-shelters scattered over widely differing sections of our continent and there is sufficient evidence also that the aborigines have commonly made use of them. In the third place, caverns furnish exceptional conditions for the preservation of artifacts of all kinds. Consequently, one is strongly inclined to the opinion that here, if anywhere, we may hope to find solutions for some of our archaeological puzzles — the use, for example, of such problematic objects as banner stones, bird-stones, etc. Not only that but cave investigation may reasonably be expected to yield many perishable artifacts that would serve to verify and supplement our present notion, especially of the aboriginal cultures of the eastern United States. In the fourth and last place, the caves appear to hold the key to the archaeological problem — i. e., the chronology — for several large and important continental areas. The reason for this is that nowhere else can we be quite so sure of the validity of stratigraphic results as in cave-floor deposits. Shell-heaps may be almost equally satisfactory for certain coastal regions — and it may not be untimely to remark that shell-heaps have not yet been adequately investigated. The ordinary earthmound, however, or the ordinary village site, while it may furnish clues regarding the time sequence of particular traits of culture, does not appear to be suitable for speedy and precise results. Likewise our finds in drift deposits as, for instance, in the Delaware and Ohio valleys — so promising and yet so baffling; if the effort devoted to these had been expended on caves and rock-shelters we should doubtless long ago have had cleared up the issue involved.

Most of these incentives have been apparent for a long time. There can be no doubt, for example, that the remarkable European discoveries directly prompted cave investigations in this country by such men as Professors F. W. Putnam, J. C. Merriam, Charles Peabody, W. K. Moorehead, W. C. Mills, and others. At present a really considerable amount of cave work has been done in America, extending from one extreme of the continent to the other and ranging over a period of time dating back at least to 1835. Various centers such as Patagonia, Brazil, Yucatan, our own Southwest, Kentucky with adjacent states, California, and even

Alaska have been tried out more or less thoroughly, but with what have hitherto been regarded as essentially negative results. It might be profitable in this place to consider at length the history of American cave archaeology and to cite a bibliography; but time forbids. Men and institutions, one after another, appear to have taken up the work with enthusiasm and after a few years to have given it up again. The difficulty, it seems to the writer, has been that they have all expected too much. But while our work has been sporadic it has not been altogether superficial nor without value. We have learned enough perhaps to warn us against the sanguine expectations of our European colleagues and, whether or not this may account for the apparent neglect of the field, some of us are still convinced that cave work should be continued.

It was thoughts such as these that prompted the American Museum to make a preliminary examination of some of the Kentucky caverns last summer. The Mammoth Cave happened to be one of the sites chiefly because the cave management some four or five years ago made us a generous gift of archaeological material, including several choice textile specimens, found in the Mammoth and Salts caves on their estate. Our desire was to learn something of the conditions under which such perishable objects occurred, whether there might not be more, etc. There was no real expectation of finding any essentially new data here because the cave had been frequented for more than a century and in fact had been studied by no less an authority than the late Professor F. W. Putnam himself. Indeed, it is probably not far from the truth to say that it was here that Professor Putnam received the inspiration which turned him from natural to anthropological science — making him the sponsor for archaeological research all over the American continent.

The Kentucky region was deliberately chosen. For one thing it lies south of the limits of glaciation. If the Indian was in fact present on the American continent during the ice age he might as easily have inhabited Kentucky and Tennessee as his contemporaries of the Old World did the borders of the Pyrenean uplift. Geologically and topographically the two regions are in many respects similar. In both cases we have limestone formations deeply eroded and consequently abounding in caverns and rock-shelters of great age. Moreover, this very limestone was the repository of raw material of which people everywhere during the stone age stood in great need, viz., flint. But aside from this attraction the country as a whole in point of natural food resources seems to have been well suited to a primitive non-agricultural mode of life. It was well stocked with fish and game, to say nothing of vegetal products such as nuts, berries, and roots. The primeval forest of the eastern section of the state may have been heavier

•

than in the lower Pyrenean country; still, from all reports, it was less impenetrable than the half-despoiled timber lands of today. At any rate, the problem of getting about was not so difficult as might be imagined. The same geologic forces that provided caves and shelters to accommodate the primitive pioneers had also blazed avenues of communication for them, because no equivalent section in the world is better served by navigable waterways than is the commonwealth of Kentucky. Besides, the buffalo began to roam the state in late prehistoric times, his deeply worn trails connecting river-fords, salt-licks, springs, and open grasslands, following usually the easiest grade or, in other words, the lines of least resistance, thus giving rise no doubt to some of the local modern highways. Under these circumstances one may readily believe that whatever the date of arrival of aboriginal man in these parts and whatever events transpired during his occupancy, the main facts are preserved for us, at least in part, in the cave deposits.

In securing the data to be considered I am under obligation first of all to Judge Albert C. Janin of Washington, D. C., who as trustee of the Mammoth Cave Estate not only presented some of the material directly, but also encouraged my own excavations. I am likewise indebted for helpful assistance to Manager H. M. Pinson and to Miss Helen Randolph. In working up the material I have to acknowledge assistance on several points. Thus the shell species have been identified jointly by Curator L. P. Gratacap of the Museum staff and by Dr. Bryant Walker of Detroit. The animal bones were identified by Mr. H. E. Anthony and Miss Mary C. Dickerson, also of the Museum staff. The text figures were drawn by Mr. W. Baake and the plan by Mr. S. Ichikawa. Lastly I am indebted to my wife for assistance in preparation of the manuscript.

N. C. NELSON.

August, 1917.



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## INTRODUCTION.

Most of the original data embodied in the following report were collected by the writer in May and November, 1916. The additional items were abstracted from a series of miscellaneous cave specimens presented to the American Museum in 1913 by the Mammoth Cave Estate. The latter collection comprises catalogue numbers 20.0-5763-5778, the former numbers 20.1-136-216 and 99-7326-7331.

A preliminary visit was made to Kentucky in the month of May. At that time the writer held consultation with Professor Arthur M. Miller of the State University at Lexington regarding suitable localities for investigation. Professor Miller suggested among other places the Kentucky River, or that section of it to the south of Lexington lying between Valley View and Highbridge. He took the trouble personally to accompany me to a small cave at the upper terminal, and I later went alone to verify conditions at the lower end. This stretch of the Kentucky, like the middle courses of the other rivers of the state, is cut deeply into a limestone formation underlying the gently sloping tableland. The gorge at Highbridge is a little over three hundred feet deep and the towering palisades on either side of the river have been so far eroded as to afford numerous ledges and overhangs. A number of caves are also present, some of them, according to reports, showing indubitable evidence of Indian occupation. Village sites are likewise reported along the river, both on the plateau proper and on the narrow strips of bottom land occasionally wedged in between the river channel and one of the gorge walls. In such a locality the problem of secure and comfortable shelter was easily solved. But whether the Indian occupied the region, in particular the natural shelters, for any great length of time can, of course, be determined only by excavation, and this I found no opportunity to undertake.

The second locality to be inspected and the one in which excavations were later commenced, was a short stretch of the Green River in the vicinity of Mammoth Cave in Edmonson County. Although nearly one hundred miles southwest of the Kentucky River segment described above, the general conditions are very similar excepting that caverns are here far more numerous. Green River is a stately current running through a deep winding gorge and locally peculiar in that it is fed almost entirely from underground sources — a fact intimately connected with the production of caverns. The border country is again a plateau, forested and somewhat undulating, but averaging about three hundred feet above the river level.

This plateau is characterized in the first place by occasional outstanding "knobs" and in the second place by numerous sink-hole basins.

The knobs are eminences of a pyramidal character, sometimes several hundred feet high and usually capped with sandstone, which register for us in a rough way the amount of erosion to which the country has been subjected. They are of special interest to the archaeologist chiefly because many of them are natural strongholds and as such were occupied by the Indians at least in relatively late times. As good local examples of these knobs there might be cited Indian Hill <sup>1</sup> and Somerset Hill, the former about twelve miles down the Green River and the latter about eighteen miles up the same stream from Mammoth Cave.

The sink-hole basins, on the other hand, are depressions in the plateau surface resulting from the collapse of cavern roofs beneath. These basins act the part of funnels in catching up all the rain waters which usually drain through a vent in the bottom of each one and finally reach the river by devious underground channels. The waters in passage dissolve and wear away the limestone, thus gradually weakening the formation until new collapses and consequent sink-holes are added. This process of subterranean erosion has been calculated to have been going on for one or two million years <sup>2</sup> until the whole formation from the top of the plateau to the river level has been literally honeycombed with caverns. The Mammoth Cave, for example, is said to exhibit no less than five levels of galleries, the lowest of which is near enough to the river level to be flooded by the back-waters of the spring rise and therefore still in process of formation, while the upper is little more than fifty feet below the plateau surface and in process of refilling.

Without professing to deal with the geology in a technical way, it must be obvious from the foregoing facts that the upper levels of these caverns are exceedingly old. They are in the majority of cases both dry and comfortable, with a constant temperature of about 54 degrees Fahrenheit; in short, peculiarly suitable for the accommodation of early man. Here he could find protection from the elements as well as from pursuing enemies; here he could store his provisions indefinitely and preserve the remains of his dead; and here, finally, he was able to secure, in workable condition, one of his greatest necessities, namely, flint. It should therefore be no cause for wonder that many of the caverns and rock-shelters in the vicinity of Mammoth Cave, including that cave itself, give visible evidence of having been frequented by the aborigines.

The specific localities investigated in the Green River country embrace caverns, rock-shelters and "flint sites," i. e., spots in the cultivated fields

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<sup>1</sup> Putnam, (c), Vol. III, 62; Moore, 439, 487.

<sup>2</sup> Shaler, 8.

were worked and reject flints (strictly speaking, chert or hornstone), etc., occur in quantity. For the sake of brevity, as well as clearness, the principal stations and the nature of the archaeological material obtained from them are presented in tabular form as follows:—

o.	Name or Locality	Ashes	Shell refuse	Animal bones	Human bones	Chipped flints, etc.	Ground stone implements	Bone implements	Shell artifacts	Potsherds	Textiles, gourds, etc.
1	Mammoth Cave vestibule	*	*	*	*	*	*	*	*		
2	Mammoth Cave interior	*			(*)	*					*
3	Flint site in clearing above Mammoth Cave					*					
4	Flint site in valley bottom below Mammoth Cave					*					
5	Dixon's Cave, near Mammoth Cave					*					
6	Cave adjoining White Onyx Cave, near Mammoth Cave			(*)	(*)						
7	Moonshiners' Cave, $\frac{1}{2}$ mile below Mammoth Cave landing										
8	Flint site on valley bottom opposite Moonshiners' Cave					*					
9	Bone Cave, ca. 5 miles below Mammoth Cave landing, right bank			*	(*)						
10	Rock-shelter, ca. 200 yards below Bone Cave, right bank	*		*	*	*				*	
11	Haunted Cave, ca. 6 miles below Mammoth Cave landing, right bank										
12	Cedar Sink, 5-6 miles southwest of Mammoth Cave					*					
13	Rock-shelters (2) on the Napa farm, ca. 2 miles above Mammoth Cave landing, right bank			*		*					
14	Flint site on the Napa farm, ca. 2 miles above Mammoth Cave landing, right bank					*					
15	Flint site in Eden Valley, south of Three Springs					*					
16	Flint site and rock-shelter near Preacher Brown's house					*					
17	Flint site around Curtis Cave entrance, Eden Valley, ca. 2 miles east of Mammoth Cave					*	(*)				
18	Flint sites above and below Bedquilt Cave					*					
19	Salts Cave entrance and vestibule	*	*	*	*	*					
20	Salts Cave interior	*									*
21	Flint site in field surrounding Salts Cave					*					
22	Lard Cave and field, 15 miles up river, near Rowletts			(*)	(*)						

† Sites tested by investigation.

(\*) Reported finds.

All but the last-named situation are within a radius of six miles of the Mammoth Cave. Within this area many additional but mostly nameless places were indeed superficially examined with negative results, the sites listed above being merely such as were either tried out by excavation or on which positive data were obtained without prospecting. Yet the search was by no means exhaustive, as was made apparent during the last few days of my stay when reports began to come from various quarters about "Indian caves," etc., though evidently some of these were outside the six-mile limit.

As may be observed in the table, the majority of the real archaeological stations are characterized by the presence of flint artifacts and by little else. The three or four principal exceptions are numbers 1 and 2, 10 and 19. Of these the last-mentioned, viz., the Salts Cave, may properly be omitted from detailed discussion. Several days were in fact devoted to work in and around the entrance to this great cavern but no refuse deposits could be located which had not already been turned over by previous investigators. Consequently, there is nothing of importance to add to the published observations on this site and the present new developments in the local archaeological problem are based on data obtained at sites 1, 3, 8, 10, 17, and 21, in fact almost altogether on sites 1 and 10, i. e., the Mammoth Cave vestibule and the small rock-shelter near Bone Cave.

Before proceeding to the subject it seems necessary to call special attention to the fact that the archaeological material to be presented comes mainly from three different sources, namely: (1) the open fields around the cave entrances, (2) the cave entrances proper, and (3) the cave interiors. Unfortunately, these three groups of data are somewhat disparate phenomena; that is to say, our understanding of their connections, culturally and chronologically, is incomplete. The relation of the cave vestibule material to that of the cave interiors is reasonably clear; but there is no telling where the surface material from around the cave entrances belongs. In other words, the inner logic of our theme does not show where we should begin or where end. Any one of several possible mechanical arrangements is open to objections. Up to the present time nothing trenchant has been published except on data from the cave interiors and it would seem most natural perhaps to begin with that division of our subject already made partially familiar. The historical perspective of the local archaeological investigations is, however, deemed of secondary importance in a disquisition of this kind and it will therefore be ignored. The troublesome division of our subject, i. e., the data from the surface around the cave entrances, will be taken up first and disposed of very briefly by descriptions and comparisons. Next we shall pass in review all the published and newly

ed data from the interior of the caves and point out their close relation to the moundbuilder culture and their comparatively modern origin. nally, we shall turn to a more intensive study of the new line of data erred in the Mammoth Cave vestibule, which data seem to the to be indicative of an older and more primitive stage of culture than t been recorded in this section of the country.



## SURFACE SITES, MAINLY AROUND CAVE ENTRANCES.

Among the "curiosities" offered for sale to the Mammoth Cave visitors in 1916 were several arrow points and similar objects of chert. Inquiry disclosed that the disposal of such things was once a fairly thriving business and that certain individuals of the neighborhood have scoured the surrounding country to keep up the supply. The places where the relics occurred were spoken of as *flint sites*; and subsequent visits to some of the nearest of these revealed them to be probably either village sites or workshops. Naturally, after being hunted over for two or three generations, these places yield very few of the well finished and easily recognizable types of artifacts; but the less specialized types, such as scrapers or the unfinished forms of chipped blades, are still quite common. The most productive sites discovered were numbers 3, 8, 17, and 21 of the table in the introduction (p. 11) and all the specimens presently to be described were obtained at one or the other of these four places.

## GENERAL DESCRIPTION OF SITES.

*Mammoth Cave Field.* Site number 3 denotes the wooded slope and the adjacent plateau directly above and east of the Mammoth Cave entrance. Owing perhaps to a partial reforestation of the locality since aboriginal days and possibly also to the more intensive searching on the part of relic hunters, comparatively little archaeological material was to be seen here. If the place was a village site, as would seem probable, there were no distinct indications of any kind to prove it either in the way of house sites, black camp dirt, broken pottery, or abraded stone objects. Only about sixty worked and unworked pieces of chert were brought away, but the fact that they occurred so close to the cave entrance seemed very suggestive.

*Moonshiners' Cave Field.* The locality given as number 8 (p. 11) is a small semicircular flat partly enclosed by the first bend of the Green River below Mammoth Cave Landing and situated directly opposite Moonshiners' Cave. There is, however, no apparent relation between the flint site and the cave other than that of juxtaposition, and the name has been applied merely as a convenient designation. The situation seems strongly sugges-

tive of a village site but the field has been under cultivation for a long time and it may also have been flooded repeatedly so that no aboriginal traces except chert fragments remain. At the time of the visit the field was in grass and a workman and myself in the course of a half hour picked up only eighteen more or less distinctly worked specimens; but, according to common report, it was formerly a very rich site.

*Curtis Cave Field.* Site number 17 indicates the little-known Curtis Cave, located in the Eden Valley, roughly two miles east of Mammoth Cave. The entrance to the cave is situated in an open cultivated field close to the base of a low wooded hill and is choked up with alluvium so that it cannot be traversed without a good deal of preliminary excavation. The surrounding field for some two hundred yards in certain directions is liberally strewn with fractured chert and apparently nothing else. To be sure, reports were current that "pestles" and other things had been found here; but while in the course of an hour's search we picked up over one hundred pieces of worked chert we did not observe a single indication of abraded stone work. This site is also known as one formerly rich in fine chipped stone specimens and a large fairly exquisite but typical spear point, said to have come from the place, was seen in the possession of a neighboring farmer.

*Salts Cave Field.* The last surface site to be specifically mentioned is number 21 of the preceding table, viz., the field surrounding the entrance to Salts Cave. This archaeologically well-known underground den is located some three miles in a northeasterly direction from Mammoth Cave and in surroundings that might be characterized as gently rolling country. In the midst of an open field there is to be seen a clump of trees standing apparently on a low hillock. Going up the incline and stepping in among the trees one is unexpectedly confronted by a sink-hole measuring something over 100 by 150 feet on the horizontal and perhaps 50 or 60 feet in depth. The north slope of the bowl is particularly steep, being in fact partly broken by vertical rock exposures. From a gouged out seam in the rock, some 25 feet below the rim of the bowl, there issues a small stream of water which pours over the remainder of the escarpment below and falls directly into the small entrance to the cave. In all probability the stream produced the entrance, though that is a suggestion of no particular concern to us. The local conditions have been outlined merely to show that we have here in close proximity all the elemental necessities conducive to permanent settlement, such as wood, water, soil for cultivation, and even shelter, if desired. Accordingly, the evidences of aboriginal frequentation in and around the entrance to this great cavern are no cause for surprise.

As has already been stated, there are indications that the entrance to

the cave was used for camping purposes<sup>1</sup>; although, in reality, only to a very slight extent. The reason for this was doubtless that the vestibule contained scarcely any level floor space and, what was more important, daylight could not reach even what little suitable camping space there was. Nevertheless, chert fragments were found both in the vestibule and on the slope of the sink-hole outside; though their frequency here was nothing compared to what was observed in the cultivated field surrounding the sink-hole. Repeated searches were made here and forty-two worked chert pieces out of over two hundred odd finds were brought away; but, as in the case of the preceding sites, nothing else was found to indicate that there had ever been a village in the vicinity.

Citations of similar additional archaeological stations might be given on hearsay but the above will suffice. Whatever these places are, whether village sites or workshops, the conviction was inescapable from the start that they bore some intimate relation to their respectively adjoining caves. That the chert was quarried in the caves, as now seems most probable, did not occur to the writer at the time. Instead it seemed that the Indian perhaps chose to build his village near some cave entrance so that in time of trouble he might have a place of safety. If not that, then, inasmuch as he could hardly have lived permanently in the cave interiors, he must have lived in the entrances. Was it not already shown that he had lived in the Salts Cave entrance, even if the evidence was incommensurate with the amount of chert scattered in the surrounding field? It was reasoning of this sort that later resulted in excavations in the Mammoth Cave vestibule.

#### CHERT ARTIFACTS DISCOVERED.

The investigation of the Green River surface sites having been both local and desultory it seems useless at this time to attempt detailed textual descriptions of all the items discovered. Several writers such as Carr, Fowke, Young, Moorehead, and others have already familiarized us with the general nature of Kentucky's chipped implements. A rough analysis of the recognizable forms, with some illustrations, is needed, however, for purposes of comparison with the chipped artifacts from the Mammoth Cave vestibule to be described later. In addition, there are three forms which appear to merit special attention because of marked resemblances they bear to certain well-recognized European palaeoliths.

*Miscellaneous Forms.* The miscellaneous surface collections, partially illustrated in Fig. 1, appear to include:—

<sup>1</sup> Young, 305.





Fig. 1 *a* (20.1-212a), *b* (20.1-209a) *c* (20.1-212b), *d* (20.1-203a), *e* (20.1-209b), *f* (20.1-205), *g* (20.1-212c), *h* (20.1-203b), *i* (20.1-203c), *j* (20.1-212d), *k* (20.1-203d), *l* (20.1-213a), *m* (20.1-203e), *n* (20.1-209c). Chipped Implements from Surface Sites.  
 ‡ Nat. size.

- I. *Core Forms — Flaked and Chipped All Over*
  1. Unfinished Blades
    - a Oblong (Fig. 1a)
    - b Nearly disk-shaped
  2. Spear Points
    - a Notched for attachment (Fig. 1b)
    - b Stemmed for attachment (Fig. 1c)
  3. Arrow Points
    - a Notched (?)
    - b Stemmed (Figs. 1e, f)
  4. Knives or Scrapers (Fig. 1d)
  5. Scrapers
    - a Notched edge (Fig. 1g)
    - b Rounded edge (Fig. 1h)
  6. Perforators (Fig. 1i)
- II. *Flake Forms — Chipped on Convex Side Only*
  1. Scrapers — more or less thick
    - a Side-scraper (?), i. e., *racloir* (Fig. 1j)
    - b End-scraper or planing tool (?), i. e., *grattoir* (Fig. 1k)
    - c Notched scraper (Fig. 1m)
  2. Knives or thin scrapers
    - a Oblong (Fig. 1n)
    - b Disk-shaped (Fig. 1l)
    - c Irregular forms

The "flake form" division of the preceding list contains several specimens which are suggestive of European palaeoliths, particularly those illustrated by Fig. 1k, l, n. Roughly speaking, they consist of concavo-convex flakes which have been retouched by chipping along the edge, the chipping having invariably been done from the concave side. Fig. 1k might pass for a Mousterian scraper and Fig. 1n is a blade of the sort that is very common in Aurignacian and later deposits. But with only a few specimens in hand it would be unprofitable to dwell at length on the suggested similarities.

*End-Scrapers.* A rather more interesting type of tool, of which several examples were found in the Curtis Cave Field, is shown in Fig. 2. The type is well known and has been figured and described before.<sup>1</sup> It appears to occur practically all over the Mississippi Basin, including western Texas, New Mexico, and Wyoming. Moorehead classifies the type as a "spoon-shaped" scraper and the labels in the National Museum identify it as a "duck-billed" scraper. The different ideas suggested by these terminologies correspond in a measure to an actual difference in form between the specimens from the eastern and western borders of the range of distribution. Those of the west, say from North Dakota or from the Staked Plain of Texas,

<sup>1</sup> Fowke, 170; Moorehead, (c), 198-209.



are generally rather short and rounded or oval in outline, while those from the states east of the Mississippi are more often oblong, as in the case of the given illustration. Essentially, the particular specimens with which we are here concerned are more or less prismatic flakes, of somewhat triangular outline, the broader, thicker ends of which have been dressed by chipping to a very high or abrupt angle. Often the chipping has been carried along one of the sides, occasionally even both sides; but in some specimens it is confined entirely to the end. Evidently the end retouch was for purposes of utilization while the side retouch was probably for accommodation.

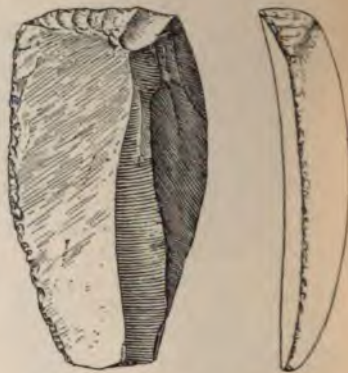


Fig. 2 (20.1-212e). Typical Chipped End-Scraper from Surface Site.

From the fact that this type of implement seems to belong to the Plains Area it has generally been regarded as a skin scraper; and the majority of the specimens being too short and stubby to be held effectively by the fingers it has been inferred that they were set in handles of wood or bone. Whether hafted specimens have ever been found I have not been able to ascertain, but in any case there seems to be no reason for promulgating a new theory about them. The western forms being little more than an inch in length they must undoubtedly have been hafted, but it seems quite possible for the specimen here illustrated to have been held directly in the hand, although it is only of medium length. Whether their use was entirely confined to skin-dressing may be questioned; some might conceivably have been used also for scraping wood or bone. The abrupt and somewhat dulled edge was no doubt deliberately devised for purposes of control. By this is meant that whereas a thin cutting edge might take too large a bite and thus ruin the object on which it is being used, a dull abrupt edge like the one here adopted could not do so. This difference is in a measure comparable to that existing between the spoke-shave and the plane.

But the point of chief interest about this tool is that in general form and in mode of production it is almost identical with the European *grattoir* of the middle and upper palaeolithic industries. The European type to be sure is usually longer and the retouched end is more often rounded than straight, as in the illustration. Besides, the French forms at least are made with superior skill and precision owing probably to the greater tractability of the raw material employed. Now, as is well known, the European

archaeologists have long regarded their *grattoir* as a sort of primitive planing tool; and while this explanation need not be entirely discredited it would seem possible that we might in time convince them that some of these planing tools were skin-dressing implements.

*Side-Scrapers.* In addition to the roughly crescentic side-scraper

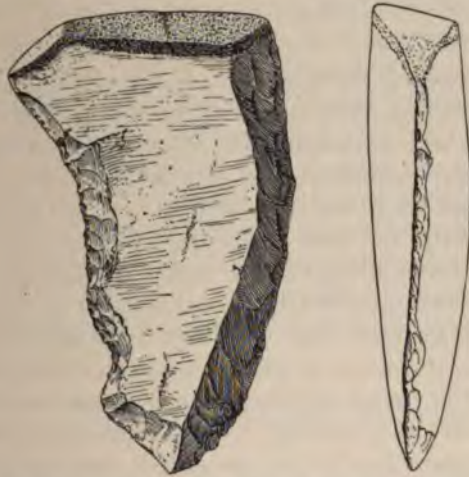


Fig. 3 (20.1-213b). Chipped Side-Scraper from Surface Site. Nat. size.

illustrated by Fig. 1j, two or three others were found in the Curtis Cave Field. The most interesting of these is shown in Fig. 3. It is an oblong, slightly curved flake of triangular cross-section. The one thin incurving edge has been slightly retouched on one side, presumably for scraping purposes, while the thick edge, or back, has been chipped it would seem for purposes of accommodating the hand. It is an implement which would delight Professor Rutot. But without going into further details, we may conclude simply by stating that this tool and the similar ones mentioned might very easily pass for Mousterian scrapers.

*Geometric Form.* The last specimen to be singled out from the surface collections is shown in Fig. 4. Unfortunately it is the only one of its kind available and perhaps apology is due for presenting it. I have no desire to classify it or even to describe it in detail.

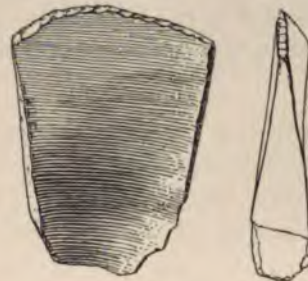


Fig. 4 (20.1-212f). Chipped Geometric Implement from Surface Site. Nat. size.

Possibly it is nothing more than an odd form of the previously described end-scraper; but it looks very much like the geometric flints of late palaeolithic times. At least it is not a fragment of a larger tool: it was deliberately made into its present form.

#### CONCLUSIONS.

Perhaps before leaving the subject it may be well to state that there is no attempt to mislead anybody regarding the Green River flint industries. The liberties taken with terminology and the comparisons made with European palaeoliths have been resorted to only for purposes of precision. Our Kentucky specimens might be of historic date so far as evidence to the contrary is concerned; but their resemblance to palaeolithic forms is not fancied. It is my personal opinion that were a well-selected series of these specimens handed over in an unlabelled condition to an European archaeologist the chances are more than even that he would recognize them as palaeoliths and would proceed to distribute them over the whole range of that culture. But of course no sound inferences can be drawn from this fact regarding American chronology. For the present at least our specimens are merely proofs that in the elementary stages of tool-making the Indian and the palaeolithic man of Europe hit on the same processes, simply because they were the right processes.

As to the nature of the sites themselves at which the specimens were picked up, no positive conclusion can be reached. They may have been village sites in spite of the fact that no evidence exists to that effect; but, inasmuch as we shall show later on that the chert in question was probably quarried in the respectively adjacent caves, it seems at least reasonably certain that our surface sites are essentially workshops, if nothing more.

## INTERIORS OF THE MAMMOTH AND NEIGHBORING CAVES.

The present investigation was not extended in any protracted or systematic way to the interior of the caverns in the Green River country, for the reason mainly that this line of work seemed already well in hand. To have accomplished anything further of prime importance would have required more time than was at my disposal. A hasty examination was made in the forward part of Salts Cave, but only a very few notes and collections were secured. In the Mammoth Cave, besides two or three preliminary visits, one entire day was devoted to a special examination of the main cave and a few of its secondary passages lying between the entrance and the dome known as Chief City. Some of the resulting data are new and worth recording, but before doing so it seems desirable to detail in a summary way the essential facts already placed on record by prior investigators.

## EARLIEST DISCOVERIES, 1810-1820.

The date of discovery and the history of early exploration, not only of the Mammoth Cave but of many other caverns in the vicinity, are shrouded in uncertainty.<sup>1</sup> As a natural result, there is some confusion regarding the origin of many of the archaeological specimens recorded in the early writings. The late Professor F. W. Putnam while a member of the Kentucky Geological Survey, from 1870 to 1875 or thereabouts, was probably the first to approach the subject in a scientific manner. He made explorations of his own in several of the caves in question and he also reviewed the origin and nature of the earlier finds, some of which date back to about the year 1810.

One find in particular, that of a richly furnished mummy, is of interest because it was minutely described as early as 1813, when it was exhibited in the Mammoth Cave. This description is quoted by Lewis Collins in his *History of Kentucky*,<sup>2</sup> from which the following relevant excerpts are taken: —

On my first visit to Mammoth Cave in 1813, I saw a relic of ancient times, which requires a minute description. This description is from a memorandum made in

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<sup>1</sup> For the discovery of Mammoth Cave various dates ranging from 1797 to 1809 are given. See, e. g., Hovey, 15.

<sup>2</sup> Collins, Vol. II, 159-160.



the cave at the time. In the digging of the saltpetre earth in the short cave [supposed by some to be Gothic Avenue in the Mammoth Cave], a flat rock was met with by the workmen, a little below the surface of the earth, in the cave; this stone was raised and was about four feet wide and as many long; beneath it was a square excavation about three feet deep and as many in length and width. In this small nether subterranean chamber sat in solemn silence one of the human species, a female with her wardrobe and ornaments placed at her side. The body was in a state of perfect preservation, and sitting erect. The arms were folded up, and the hands were laid across the bosom; around the two wrists was wound a small cord, designed, probably, to keep them in the posture in which they were first placed; around the body and next thereto were wrapped two deerskins. These skins appeared to have been dressed in some mode different from what is now practised by any people of whom I have any knowledge. The hair of the skins were cut off very near the surface. The skins were ornamented with the imprints of vines and leaves, which were sketched with a substance perfectly white. Outside of these two skins was a large square sheet, which was either wove or knit. The fabric was inner bark of a tree which I judge from appearance to be that of the linn tree. In its texture and appearance it resembled the south sea island cloth or matting; this sheet enveloped the whole body or [and?] head. The hair on the head was cut off within an eighth of an inch of the skin, except near the neck, where it was an inch long. The color of the hair was a dark red; the teeth were white and perfect. . . . The features of this ancient member of the human family much resembled those of a tall, handsome American woman. The forehead was high, and the head well formed. . . . I discovered no blemish upon the body, except a wound between two ribs, near the backbone; and one of the eyes had also been injured. The finger and toe nails were perfect and quite long. The features were regular. I measured the length of one of the bones of the arm with a string, from the elbow to the wrist joint, and they equalled my own in length, viz., ten and a-half inches. From the examination of the whole frame, I judged the figure to be that of a very tall female, say five feet ten inches in height. The body, at the time it was discovered, weighed but fourteen pounds, and was perfectly dry; on exposure to the atmosphere, it gained in weight, by absorbing dampness, four pounds. . . . The color of the skin was dark, not black; the flesh was hard and dry upon the bones.

At the side of the body lay a pair of moccasins, a knapsack, and an indispensable, or reticule. . . . The moccasins were made of wove or knit bark, like the wrapper I have described. Around the top was a border to add strength, and perhaps as an ornament. These were of middling size, denoting feet of a small size. The shape of the moccasins differs but little from the deerskin moccasins worn by the northern Indians. The knapsack was of a wove or knit bark, with a deep strong border around the top, and was about the size of the knapsack used by soldiers. The workmanship of it was neat, and such as would do credit, as a fabric, to a manufacturer of the present day. The reticule was also made of knit or wove bark. The shape was much like a horseman's valise, opening its whole length on the top. On the side of the opening, and a few inches from it, were two rows of loops, one row on each side. Two cords were fastened to one end of the reticule at the top, which passed through the loop on one side, and then on the other, the whole length, by which it was laced up and secured. The edges of the top of the reticule were strengthened with deep fancy borders. The articles contained in the knapsack and reticule were quite numerous, and were as follows: one head-cap, made of wove or knit

bark, without any border, and of the shape of the plainest night-cap; seven head-dresses, made of quills of large birds, and put together somewhat in the way that feather fans are made except that the pipes of the quills are not drawn to a point, but are spread out in straight lines with the top. This was done by perforating the pipe of the quill in two places, and running two cords through the holes, and then winding round the quills and the cord fine thread, to fasten each quill in the place designed for it. These cords extended some length beyond the quills on each side, so that on placing the feathers erect, the feathers could be tied together at the back of the head. This would enable the wearer to present a beautiful display of feathers standing erect, and extending a distance above the head, and entirely surrounding it. These were most splendid head-dresses, and would be a magnificent ornament to the head of a female at the present day. Several hundred strings of beads; these consisted of very hard, brown seeds, smaller than hemp seed, in each of which a small hole had been made, and through the whole a small three-corded thread, similar in appearance and texture to seine twine; these were tied up in bunches, as a merchant ties up coral beads when he exposes them for sale. The red hoofs of fawns, on a string supposed to be worn around the neck as a necklace. These hoofs were about twenty in number, and may have been emblematic of innocence. The claw of an eagle, with a hole in it, through which a cord was passed, so that it could be worn pendant from the neck. The jaw of a bear designed to be worn in the same manner as the eagle's claw, and supplied with a cord to suspend it around the neck. Two rattle-snake skins; one of these had fourteen rattles; these skins were mostly folded up. Some vegetable colors done up in leaves. A small bunch of deer sinews, resembling cat-gut in appearance. Several bunches of thread and twine, two and three threaded, some of which were nearly white. Several needles some of which were of horn and some of bone; they were smooth, and appeared to have been much used. These needles had each a knob or whorl at the top, and at the other end were brought to a point like a large sail needle. They had no eyelets to receive a thread. The top of one of these needles was handsomely scalloped. A hand-piece made of deer skin, with a hole through it for the thumb, and designed probably to protect the hand in the use of the needle, the same as thimbles are now used. Two whistles, about eight inches long, made of cane, with a joint about one-third the length; over the joint is an opening, extending to each side of the tube of the whistle; these openings were about three-quarters of an inch long, and an inch wide, and each had a flat reed placed in the opening. These whistles were tied together with a cord wound around them.

The author of the description, whose identity is uncertain,<sup>1</sup> has been held by some to ascribe the origin of his specimens to the Mammoth Cave. An uncritical reading of his text might perhaps yield such an interpretation, but in any case it is contradicted by at least two contemporary writers.<sup>2</sup> Professor Putnam probably discovered this for himself because in 1875 we find him referring the mummy to Short Cave,<sup>3</sup> some eight miles away, while

<sup>1</sup> Collins, writing prior to 1847, in Vol. II, 159, refers to him as "a highly scientific gentleman of New York," while Professor Putnam, who quotes this same passage in full about 1875, (see *b*, 314) refers to it as probably written by one Mr. Merriam of Brooklyn.

<sup>2</sup> Farnham, 360; Wilkins, 361-363.

<sup>3</sup> Putnam, *e. g.*, (c), 413; (d), 8.



Dr. Hovey in his Mammoth Cave guidebook (1912) credits the same find to Salts Cave.<sup>1</sup> The actual facts of the case do not appeal to me as of any great importance. The writings of the day make it perfectly evident that several desiccated bodies were found at about the same time (1810-20), some in the caverns and rock-shelters of Kentucky<sup>2</sup> and others in similar places in Tennessee;<sup>3</sup> and there is no inherent reason why one or more of these should not have come from the Mammoth Cave, especially as both Collins and Hovey state that skeletal material was uncovered here, presumably by the saltpetre workers, in the front part of the cavern.<sup>4</sup> The Salts Cave finds alone seem to be entirely authentic, perhaps because of relatively late date, and Mr. H. C. Ganter of Glasgow Junction still possesses a mummy said to have been found here. A number of mummy discoveries evidently belonging to one and the same culture level being thus confused, I can do no better in this place than to list the objects found with them, regardless of the cave from which they may have been derived. The important items are as follows:—

1. Cords, two, three and five stranded.
2. Fishing nets, fragments of.
3. Matting.
4. Baskets, fragments of.
5. Basket-coffins made of cane.
6. Cloth, two different kinds, woven or knitted of bark.
7. Bags, different sizes, woven or knitted of bark.
8. Moccasins, different sizes, woven or knitted of bark or flags.
9. Head-cap, woven or knitted of bark.
10. Belts.
11. Dressed deerskins, ornamented with imprints of vines and leaves.
12. Dressed deerskins with hair shaved off.
13. Headdresses of feathers.
14. Mantle covered with feathers—apparently attached shingle-roof fashion.
15. Blanket woven of feathers—same principle as the feather blankets from the Cliff Dwellings of the Southwest.
16. Fan of turkey tail-feathers.
17. Strings of beads made of perforated seeds.
18. Indian beads, two—presumably of stone but not found with mummy.
19. Necklace of fawn hoofs.
20. Pendant of eagle claw with suspension cord.
21. Pendant of bear jaw with suspension cord.
22. Needles, or awls, of bone and antler.
23. Whistles of cane reeds.
24. Wooden bowl,  $\frac{1}{2}$  pint capacity—not found with mummy.

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<sup>1</sup> Hovey, 33.

<sup>2</sup> Mitchell, 319.

<sup>3</sup> Jones, 1-6.

<sup>4</sup> Collins, II, 158; Hovey, 34.

25. Bows and arrows.
26. Poles cut with flint stones.
27. Rattlesnake skins.
28. Vegetable colors done up in leaves.
29. Deer sinews — and other minor objects.
30. Pottery vessels and fragments <sup>1</sup>.

This diversified list of cultural data speaks for itself and it is necessary merely in this place to point out to the reader two important facts concerning it. The first is that all but two or three of the above items were the accompaniments of so-called mummies; and the second is that while it is impossible now to find out how these mummies were disposed of in the caves, some at least were secreted in stone graves <sup>2</sup> of the identical type commonly met with in the aboriginal cemeteries of both Kentucky and Tennessee and beyond.

#### KENTUCKY GEOLOGICAL SURVEY DISCOVERIES, 1870-1875.

The comprehensive State Surveys of Kentucky, begun about 1870 under the direction of Professor N. S. Shaler, resulted in a new body of archaeological data being gathered from the Green River caves. On the scientific staff was the late Professor F. W. Putnam, serving in the capacity of naturalist. His work, as it happened, included a study of the cave fauna and while collecting this material his attention was forcibly drawn to the evidence of aboriginal visitation in the caves. Precisely what and how much of strictly archaeological work Professor Putnam really did is not quite clear; but Shaler, in his preface to the first memoir of the survey, especially announces a monograph by Putnam entitled: "On the Cavern Dwelling Races of Kentucky," with six plates. This paper unfortunately

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<sup>1</sup> The above items are abstracted mostly from notes and letters written under dates ranging from about 1813 to 1820, i. e., shortly after the discovery of several mummies in the Green River country. See bibliography under:

Fiske, 303-304; Mitchill, 319-320, 321-323, 329-330; Putnam, (b), 323-328; Wilkins, 362-363; see also Collins and Jones.

The history of the collection is partly known. Prior to 1815 most of it fell into the hands of the American Antiquarian Society, Worcester, Massachusetts, where it remained in 1875 when Professor Putnam reviewed it. Since then the mummy and probably all of its accompaniments are said to have been turned over to the National Museum, Washington, D. C., where some of the material appears to be on exhibit, as I have recently seen fragments corresponding to items 8, 13, 17 and also item 24, i. e., the wooden bowl. This last is possibly the hitherto mythical specimen which gave rise to the name Wooden Bowl Room for one of the chambers in the Mammoth Cave. The National Museum acquired a collection of textiles said to have been found (about 1877) with a mummy in a cave eight miles from Mammoth Cave and which has been described and partly figured. See Holmes, (b), 34.

<sup>2</sup> Wilkins, 362; Mitchill, 318; Putnam, (e), I, 5: 21.



was not issued, and Putnam's discoveries are set forth only in a limited way in the Peabody Museum reports and in several of the scientific periodicals of the day, already cited. In these abstracts it appears that Putnam collected most of his archaeological data in the Salts Cave, although he evidently also visited the Mammoth Cave and found similar if not as many specimens in that place. The list of specimens extracted from Professor Putnam's writing<sup>1</sup> includes:—

1. Bundles of raw textile materials.
2. Cords, different sizes.
3. Tassel or fringe of neatly braided fiber.
4. Cloth, finely woven, dyed black stripes, darned.
5. Moccasins of different sizes and materials.
6. Feathers, of turkey?
7. Reed torches tied with strips of bark.
8. Burnt sticks showing choppings of stone ax.
9. Gourds, fragments of large.
10. Wooden platter, fragment of a.
11. Pendant of perforated *unio* shell.
12. Arrow point of flint.
13. Fresh-water shells.
14. Animal bones.
15. Human excrement.
16. Skeletal remains, a considerable amount of.
17. Fireplaces and faggot stations.
18. Imprints of sandalled feet.<sup>2</sup>

As Professor Putnam has himself observed,<sup>3</sup> his list of data corresponds in many points with those associated with the mummies and it is hardly to be questioned that the two series of artifacts belong to one and the same type of culture. In other words, we seem warranted in concluding that the people who buried their dead in the caves were the same who left their effects scattered about on the cavern floors.

#### RECENT DISCOVERIES.

The archaeological cave investigations begun by the Kentucky State Survey came to an abrupt end apparently about 1875 and since then nothing seems to have been done until a few years ago when Colonel Bennett H. Young of Louisville took a hand. As a man of wide interests and broad

<sup>1</sup> Putnam, (b), (c), (d).

<sup>2</sup> This series of specimens is still extant at the Peabody Museum, Cambridge, Massachusetts.

<sup>3</sup> Putnam, (d), 8; (e), I. 8: 50.

sympathies Colonel Young for many years has been an enthusiastic collector of things relating to the prehistory of his state. His lectures on archaeological subjects have excited much interest in his own section of the country and in 1910, at the invitation of the Filson Club of his city, he prepared a sumptuous volume on the "Prehistoric Men of Kentucky," cited in the bibliography. The author expressly disclaims all effort at scientific presentation; nevertheless, the volume, in addition to its fine illustrations of rare and valuable specimens, sets forth not a few facts of importance.

Commencing in 1894 as a field explorer, Colonel Young gave particular attention to the Mammoth, the Salts, and the Colossal caverns; but like his predecessor, Professor Putnam, he seems to have found most of his specimens in the Salts Cave. In this last-mentioned place he made several new observations. Thus he located and worked a refuse deposit directly inside the entrance; he observed — as did the writer — that the salts efflorescing on the cave walls had in many places been carefully scraped away, though whether by the aborigines or not is uncertain; and he found places in the cave where an ocher-like clay had been dug. He also made note of the fact that worked and reject flints, etc., are strewn over the cultivated fields for a hundred yards or more around the entrance to the cave, indicating, probably, the former presence of a village or a workshop. Of movable cave artifacts he secured a long and interesting list, and I will cite those things not already included among Professor Putnam's finds. The list follows:—

1. Cords, two, three, four and five stranded, twisted, plaited, spliced.
2. Cloth, different weaves, some white striped.
3. Matting — reported found.
4. Moccasins, braided of cattail, of inner bark, of wild hemp; mended.
5. Reticule or bag, 8 by 12 inches, woven, with two handles of plaited cord.
6. Headdress of basket work of split cane.
7. Turkey feathers with perforation.
8. Cup made from squash shell or rind.
9. Bottle of gourd, half-gallon capacity.
10. Vessels of gourd, one showing evidence of boiling by means of hot stones.
11. Platters made from gourd and mended, with string.
12. Bowl or platter of sassafras wood, fragment of.
13. Digging or planting sticks.
14. Ladders of oak sapling and cedar, with branches.
15. Scrapers of mussel shell.
16. Bone awl.
17. Notched flint ax.
18. Chisel-like celt.
19. Pestle of stone.
20. Pottery vessel.
21. Bundles of firewood and faggot reeds.

22. Gourds and gourd seeds, some of which have been germinated.
23. Squash and squash seeds.
24. Watermelon rind and seeds.
25. Corncobs, apparently of three different varieties.
26. Sunflower head.
27. Wild grape stems.
28. Human excrement, indicating that sunflower and watermelon seeds, also hickory nuts, formed part of diet.
29. Tobacco leaves and seed pods.

This series of specimens, and others not mentioned — being simply duplicates of Professor Putnam's list,—were either found by Colonel Young or came under his direct observation and are nearly all illustrated in his book. I have not had opportunity personally to examine either this or any of the preceding collections, though probably even the oldest are still in part extant; and I have cited these lists merely for what they may be worth without comment and without accepting any responsibility for their absolute correctness.

There is one critical observation to be made in reference to Colonel Young's collection, and that is that he failed to keep separate his finds from the interiors of the caverns and those from the camp refuse worked over by him in the entrance to Salts Cave. This is unfortunate because, as will be made clear later on, it is possible that the two groups of data did not belong to the same culture level and were therefore very likely not contemporary. When at Salts Cave I personally devoted some hours to searching in the entrance for refuse beds which had not already been overturned and the meager traces that I found yielded data of a character identical with the findings in the Mammoth Cave vestibule.

#### PRESENT DISCOVERIES.

##### ARTIFACTS.

*Summary List.* We come finally to a brief consideration of the Museum's own data, obtained in part as a gift and in part by the writer while at the caves.

Referring to the specimens donated in 1913 by the Mammoth Cave Estate, it should be stated first that they appear to have been found, all of them, in the Salts Cave. A few articles are not strictly of archaeological value but eliminating these we may itemize the remainder as follows:—

1. Bundles of raw textile materials: flags, grasses, etc.
2. Cords, twisted and braided.

3. Cloth, a small fragment of — probably part of a moccasin.
4. Moccasins, two, adult size, with cord lacings (?).
5. Child's moccasin.
6. Deerskin, fragment of.
7. Torch of cane reeds tied together.
8. Knitted bands of grass and bark — probably from torches.
9. Bundle of ordinary sticks.
10. Two sticks spliced or tied together with cord.
11. Charred poles with marks of stone ax.
12. Gourds and squashes, large fragments of.
13. Sunflower head, portion of.
14. Tobacco leaf.<sup>1</sup>

In addition to the above I collected personally in the interior of the Salts Cave the following:—

1. Corncob, portion of.
2. Human excrement.<sup>2</sup>

While from the interior of the Mammoth Cave were obtained:—

1. Knotted torch wrappings of bark.
2. Strings of different kinds.
3. Torch of reeds tied with bark.
4. Poles hammered and cut with stone tools.
5. Gourd fragments.
6. Human excrement.
7. Worked and reject flints.<sup>3</sup>

A desirable completeness might be attained perhaps by figuring and describing in this place each of the listed items. However, I venture to refrain partly because of the relatively limited range of the data and partly also because most of the items have been described more or less satisfactorily a number of times already in the cited bibliography. A few additional observations seem to be in place nevertheless with reference to the textiles; while the last item in the list, the worked flints, forms an entirely new lead which calls for special consideration.

*Woven Moccasins.* The shapely, slipper-like moccasins described and figured by Col. Young and others<sup>4</sup> are represented in the American Museum collection by three very frail and fragmentary examples. Two are of adult size, their extreme lengths being about  $8\frac{1}{2}$  inches; the third is of child size or barely 6 inches long, measured externally. In addition, there is a small textile fragment which, though of different technique, resembles the style

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<sup>1</sup> Cat. nos. 20.0-5763-5778.

<sup>2</sup> Cat. nos. 20.1-215-216.

<sup>3</sup> Cat. nos. 20.1-136-143.

<sup>4</sup> Young, 301-2, 306-7; Moorehead, (c), 236; Holmes, (a), Figs. 67, 101; (b), Fig. 9.

of weave employed in most of the specimens illustrated by Col. Young and is probably part of a fourth moccasin.

Each of the four specimens appears to have been woven of some kind of grass, the blades alone having been used. Neither the warp nor the woof element is appreciably twisted on itself. The warp strands (18 in one specimen and 20 in another) run lengthwise, i. e., from heel to toe, and the woof element (or elements) crosses these for the most part at a right angle. The crossing is effected in one of two ways — either in plain wicker-work fashion or in simple twined fashion, but each technique with a special modification imposed perhaps by the uniqueness of the task in hand. The variation from the normal wicker technique lies in the fact that two woof



Fig. 5.



Fig. 6.

Fig. 5. Principle of Wicker Technique employed in Kentucky Cave Moccasins.

Fig. 6. Principle of Twined Technique employed in Kentucky Cave Moccasins.

elements are used under circumstances where only one would seem to be necessary and that one of these woof elements always passes around the right marginal warp but never the left, while the other woof element always passes around the left marginal warp but never the right. An examination of Fig. 5 should make the facts clear. The variation from the normal twining technique consists simply in the fact that the successive courses of the twined woof elements are twisted in opposite directions (see Fig. 6). Why this should be so can only be conjectured. Perhaps the resulting pattern was more pleasing; but, more likely, it was another scheme by which to avoid passing both woof elements over the marginal warp strands. To be sure, as may be found by experimentation, it is possible to turn the margin by only one woof strand and still keep the usual direction of twist, as in ordinary basketry, but it would leave the margin of the moccasin



somewhat weaker. In other words, it seems probable that the manner employed was a studied technical requirement. The next question to arise is: why should the marginal warp strands never be turned by more than one of the two woof elements? Again, though there is not enough material at hand by which to prove the case, I am strongly inclined to the opinion that it was a purely technical requirement. The weaving process began at the heel and ended at the toe, or rather in a median line above the toes. By omitting to pass one of the two woof elements over the marginal

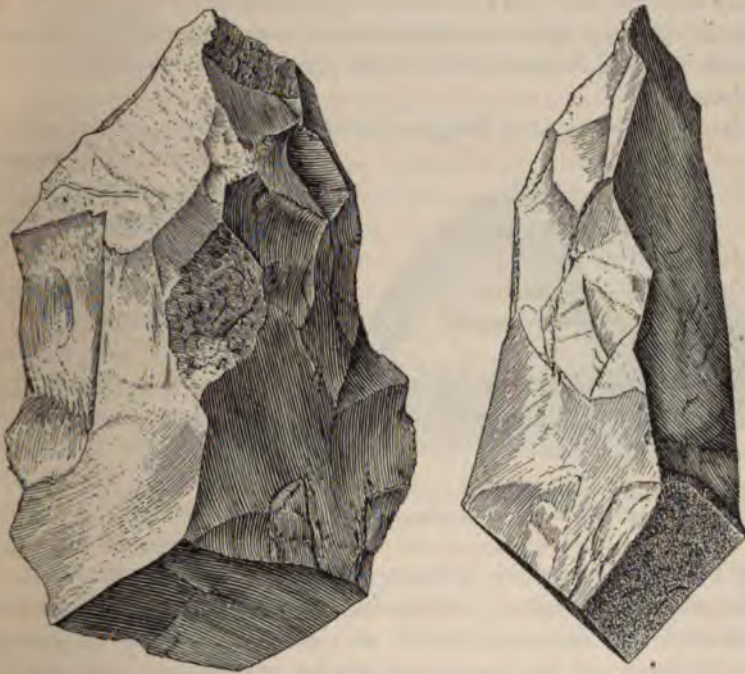


Fig. 7 (20.1-145). Roughly Blocked Out Implement from Flint Dome, Mammoth Cave. Nat. size.

warp strands the woven portion of the moccasin advanced somewhat faster in the middle than along the margins and this enabled the artisan to swing the two edges together over the toes in a perfectly natural way.

Without elaborating the facts any further in this place, we may close the subject by observing that the manufacture of moccasins of this type involves an extremely curious combination of basket-making and weaving principles, well worth further study.

*Worked Chert.* In looking over the published map of the Mammoth

Cave a place called Flint Dome was noticed. Later, when in the cave, I inquired about the place and the reason for its name. The answer was that flint occurred here and also in the neighboring passages. Mr. Louis Bransford, who was guiding, had not visited the gallery for many years and we experienced some difficulty in locating it. The floor of the narrow passages leading to our destination showed traces of both ancient fires and scattered torch reeds. But what was still more interesting was the fact that the flanking walls presented a slightly differentiated seam of rock, about two feet thick, studded with nodules of chert or hornstone. These nodules were of different sizes and projected varying distances from the wall. The projecting portions had in a great many instances been struck off, leaving exposed in the dull-colored matrix the bright blue-gray interiors of the nodules.

Here and there on the floor lay numerous incomplete nodules and frag-

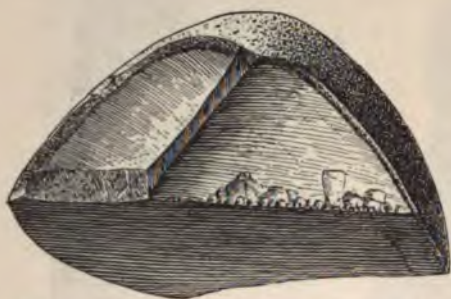


Fig. 8 (20,1-144). Scraper-like Implement from Flint Dome, Mammoth Cave. Nat. size.

ments, some with and some without incrustations. Handling a few of these I soon found two which appear to have been worked. One (Fig. 7) is a roughly flaked core of the *coup-de-poing* type, the beginning probably of a knife or a projectile point of some sort. The other (Fig. 8) is a partly incrustated flake with unmistakable evidence of chipping or retouching along one edge. This

latter is strongly suggestive of the *grattoir caréné* or keel scraper so typical of the Aurignacian culture horizon in Europe. But while such a resemblance exists and there is probability also of the specimen having been used after the manner of the Aurignacian planing-tool, the particular form here shown is no doubt purely accidental. The point to be urged here is not that this or that type of flaked or chipped stone implement was made but rather the fact that raw material for such things was obtained in the cave.

The excursion to Flint Dome was made at the end of a long exhaustive day's work and the examination given the locality was consequently far from thorough. Nevertheless, the sum of the evidence establishes beyond reasonable doubt that the Indian quarried chert in the recesses of the Mammoth Cave. Very likely most of the chert fragments discovered in the vestibule excavations and also those found in the field about the entrance were obtained from outcrops in the cave similar to the one above described.

If then, as we have seen, worked as well as reject flakes of chert are likewise strewn in quantity around the entrances to the Salts and Curtis caverns — not to mention others — is it not a reasonable inference that the aborigines have also quarried in these caves? My own conclusion is, therefore, that whatever other purposes the Indian may have had in exploring the caverns, the search for raw material for tools and weapons was one.

#### GENERAL OBSERVATIONS.

Besides the collected specimens — identical in nature with those of preceding citations — independent notice was taken also of many collateral facts observed over and over again by prior visitors and investigators.

In Salts Cave particular interest attaches to the so-called Mummy Valley chamber. There seems to be a considerable amount of ashes here, but whether the powdery material is really camp refuse I found no opportunity to determine. If camp refuse, then it must be that there was, in aboriginal times, an entrance to the cave near this place, for it is altogether improbable that anybody should have carried firewood, torch material, and all the other necessities of life by way of the present entrance and a mile and a half or so beyond it into the interior.

In the Mammoth Cave the commonest evidences of aboriginal visitations — scattered reeds, fireplaces, etc., — are most frequent in the main cave passage. They begin immediately beyond the century-old saltpetre works and continue to the Black Chamber; then there is an apparent cessation until Chief City (about three thousand yards from the entrance) is reached and beyond which the guides said very little was to be seen. But some of the side galleries were also explored by the Indian. Thus, a large gourd fragment and other things were turned up a considerable distance out Blue Spring Avenue; reeds occurred in the passage connecting Cataract Hall and Fairy Grotto; and lastly, as we have just seen, worked chert fragments were found in the passages leading off to Flint Dome. There can hardly be a doubt that a thorough archaeological exploration would show the Indian to have visited all the readily accessible parts of the cave.

Having considered the general nature of the cave artifacts, it seems well to record also a few observations as to their principal modes of occurrence and the possible significance attaching thereto. Ordinarily, the cave floor is piled unevenly with rocks and boulders, but in some places it is covered with a deposit of fine yellow sand — the same sort of sand as was found in the vestibule excavation and presumably of fluvial origin. This material is today being used for dressing the tourist paths so that here and there pits



have been dug into it and examination is possible. The formation is normally dry as dust and, what is more strange, often conspicuously loose and structureless in the upper horizons, as if it had been handled. We dug into it in many places and found sections of charred cane, sticks, bits of string, pieces of gourd, etc., at various depths, but no human bones as we had hoped. The buried artifacts were commented upon by the Mammoth Cave personnel as normal occurrences. Mr. Edward Bishop, a reliable old guide, related that among other things a moccasin had been found some years ago in the vicinity of Snowcloud at a depth of more than two feet in this sand and beneath a boulder too large for one man to move. Whether this be literally true or not is of no particular moment; the topsyturvy condition of the upper level of the sand formation is a fact, and a fact rather difficult to explain. It seems plausible, however, that prior investigators, like ourselves, may have regarded these sandbeds as desirable burial places and in their hunt for skeletons they may have overturned the material. If the disturbance is due to the Indian, as it may well be, he would seem to have handled the sand for other purposes than interment or else he must have removed his dead on departing from the locality — a rather unlikely supposition.

But so far as reports and appearances go, the evidences of aboriginal frequentation are most common in the rocky portions of the cave. Naturally, after more than a century of tourist traffic through the main avenues of the Mammoth Cave little of importance is to be found except by painstaking search. In the Salts Cave, however, conditions must until recently have been quite different for neither Professor Putnam nor Colonel Young experienced difficulty in getting their respective collections, the items of which were found lying sometimes on the rock blocks but more often in crevices between them. In the Mammoth Cave today all that can be found on the surface in the way of strictly aboriginal artifacts are occasional bits of cord, knotted strips of bark from some torch bundle, chopped sticks and such like. On the other hand, broken sections of partly burnt cane<sup>1</sup> are exceedingly common, at least in certain localities; and we may perhaps elucidate the subject to best advantage by considering in detail what seems at present to be the most important of these centers of intensification, known in cave geography as Chief City.

Chief City is an immense dome situated in what is generally referred to

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<sup>1</sup> A species of cane seemingly smaller but probably identical with that found in the cave still grows along the banks of the Green River, and a specimen brought away has been identified by Dr. Barrington Moore of the Museum Staff as *Arundinaria tecta*. Experimentation has not yet been carried out under proper conditions, but the indications are that a bundle of cane with a slight amount of nursing will yield a fairly steady flame without the application of oils or fats as some have thought essential.

as the Main Cave passage and fully three thousand yards from the entrance. It is the result of a tremendous tumble-down of rock which now rises from the normal floor level like a great heap of talus and over which the traveler has to climb. By inference from the published dimensions of the dome itself, this small mountain of *débris* measures about 300 by 550 feet on the horizontal and the height may be anywhere from 60 to 100 feet — I neglected to estimate it. In other words, the floor space within the limits of the great dome is unevenly heaped with a confused mass of broken, sharp-edged boulders, affording hardly a solitary spot sufficiently smooth and level for a man to lie down in. Nevertheless, reports (Hovey, 65-66) have been handed down to the effect that this place was a special rendezvous of the aborigines. Thus, the first white explorers are said to have found here implements and pottery as well as blankets of woven bark; and a certain Dr. Bird is quoted as having discovered in 1837 "astonishing unaccountable quantities" of cane, woven moccasins, and other remains. The combustible materials, according to the early cave managers and visitors, were sufficiently plentiful to be used in kindling bonfires with which to illumine the dome. Today no artifacts are to be found, but short sections of partly burnt cane are still thickly scattered and fireplaces are also noticeable in different places, though none with any considerable heaps of ashes.

Granting that all the above reports are substantially true, we have still to look for other convincing evidences that the place was in reality a selected retreat or camp. The Indian brought the combustibles and he no doubt also lighted most of the fires; but I searched his fireplaces in vain for a single trace of bone or shell, or anything else to indicate that he had eaten a meal here. I was told that shells had been found in the interior of the cave, but mere traces will hardly prove the existence of a permanent camp. Man in a state of nature is not a creature of nocturnal habits and we have no archaeological evidence to show that he ever resorted to anything so impractical and detrimental as to make his home in the inner depths of caverns. The idea is absurd! Yet primitive man seems to have explored caves the world over and his reasons for so doing are in most instances not at all clear. It is easy to give way to romancing on the subject and to say, e. g., that the Indian explored Mammoth Cave out of simple curiosity; but when the dangers and difficulties are soberly considered the explanation is not plausible. Neither does he appear to have used the cave as a "picture gallery" as was ostensibly the case with some of the early peoples of the Old World. With somewhat more show of reason it might be urged that the cave visitors interred their dead in the far interior as well as near the entrance; still, even if concrete evidence were present, such a custom could hardly have been general, involving as it did unnecessary practical difficulties. Chief City,

Dr. Hovey in his Mammoth Cave guidebook (1912) credits the same find to Salts Cave.<sup>1</sup> The actual facts of the case do not appeal to me as of any great importance. The writings of the day make it perfectly evident that several desiccated bodies were found at about the same time (1810-20), some in the caverns and rock-shelters of Kentucky<sup>2</sup> and others in similar places in Tennessee;<sup>3</sup> and there is no inherent reason why one or more of these should not have come from the Mammoth Cave, especially as both Collins and Hovey state that skeletal material was uncovered here, presumably by the saltpetre workers, in the front part of the cavern.<sup>4</sup> The Salts Cave finds alone seem to be entirely authentic, perhaps because of relatively late date, and Mr. H. C. Ganter of Glasgow Junction still possesses a mummy said to have been found here. A number of mummy discoveries evidently belonging to one and the same culture level being thus confused, I can do no better in this place than to list the objects found with them, regardless of the cave from which they may have been derived. The important items are as follows: —

1. Cords, two, three and five stranded.
2. Fishing nets, fragments of.
3. Matting.
4. Baskets, fragments of.
5. Basket-coffins made of cane.
6. Cloth, two different kinds, woven or knitted of bark.
7. Bags, different sizes, woven or knitted of bark.
8. Moccasins, different sizes, woven or knitted of bark or flags.
9. Head-cap, woven or knitted of bark.
10. Belts.
11. Dressed deerskins, ornamented with imprints of vines and leaves.
12. Dressed deerskins with hair shaved off.
13. Headdresses of feathers.
14. Mantle covered with feathers — apparently attached shingle-roof fashion.
15. Blanket woven of feathers — same principle as the feather blankets from the Cliff Dwellings of the Southwest.
16. Fan of turkey tail-feathers.
17. Strings of beads made of perforated seeds.
18. Indian beads, two — presumably of stone but not found with mummy.
19. Necklace of fawn hoofs.
20. Pendant of eagle claw with suspension cord.
21. Pendant of bear jaw with suspension cord.
22. Needles, or awls, of bone and antler.
23. Whistles of cane reeds.
24. Wooden bowl,  $\frac{1}{2}$  pint capacity — not found with mummy.

<sup>1</sup> Hovey, 33.

<sup>2</sup> Mitchell, 319.

<sup>3</sup> Jones, 1-6.

<sup>4</sup> Collins, II, 158; Hovey, 34.

consisted of mummies or desiccated bodies some of them secreted in stone graves and accompanied by artifacts of a particular stamp. The later discoveries, including those made by the writer, embrace mainly artifacts of the same nature as those associated with the mummies but which were found scattered loosely about on the cave floors, proving incidentally that the Indian besides burying his dead in the caves also explored their interiors for purposes of quarrying chert. The identity and nature of the two groups of archaeological cave remains are accepted to mean that they belong to one and the same people or culture group and we shall try to show in the following pages what has already been suggested, namely, that this culture group is one with the so-called stone-grave people who were mound-builders and who maintained their chief traits down into historic time.

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<sup>2</sup> Mitchill, 319.

<sup>3</sup> Jones, 1-6.

<sup>4</sup> Collins, II, 158; Hovey, 34.

of the high water mark. Semi-oval in outline, this "rock-house," as such places are called in local parlance, stretches about thirty feet along the cliff and the overhang measures as much as fifteen feet from front to rear. The place faces the sun and is a convenient and comfortable shelter, at least for summer use. The floor was strewn with slabs of rock dropped from the ceiling some four to six feet above.

#### EXCAVATIONS AND RESULTS.

The downstream half of the shelter floor appeared to contain some earth as well as rock and in about the middle of it a small pit was opened which ultimately expanded into a cavity something like 5 feet wide, 7 feet long, and  $2\frac{1}{2}$  feet deep.

*Relic-Bearing Débris and Contents.* After removing a thin covering of earth there were encountered two layers of closely fitted pieces of limestone each about three inches thick and evidently broken remains of large slabs which had fallen *en masse* from the ceiling. Beneath was another stratum of earth and then again a bed of rock, which later turned out to be a stone grave. The earth referred to averaged five inches in thickness and in about the middle of it there was a thin streak of ashes and charcoal. Special examination of these ashes brought to light several bits of animal bone, four small flint flakes, one fragmentary blade chipped from the same material, and four very small fragments of pottery. There can therefore be no question as to the *débris* being genuine aboriginal camp refuse, even were it not true that pottery had before been reported from rock-shelters in this general region.<sup>1</sup>

The potsherds alone may deserve a few words of comment, though very little can be said about them, as the largest fragment at hand is less than one inch square and no more than three-sixteenths of an inch thick. On closer scrutiny the sherd appears striated as if "wiped" in finishing. Its color on the outside is faintly reddish but the inner surface is black and crackled. The paste is heavily tempered by coarse crystalline rock particles — a fact of some interest because the large collection of pottery fragments recovered many years ago by the American Museum Expedition to the Fox Farm, in Mason County, northeastern Kentucky, appear invariably to be tempered with crushed shell.<sup>2</sup> In general, however, the ware seems to conform to that typical of the region at large and which, as far as I have observed, is of only ordinary excellence.

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<sup>1</sup> Putnam, (b), 316; (e), 209, 491.

<sup>2</sup> Smith, (a), 190.



*Stone Grave and Contents.* The second deposition of rock encountered in the excavation exhibited relations indicating the presence of a grave, which was ultimately laid bare as shown in Fig. 9. It is, of course, an example of a mode of burial with which we are already familiar not only in Kentucky but in surrounding states. The cist in this instance is roughly oval in outline, measuring about 2 feet 6 inches by 3 feet 8 inches on the inside. It was constructed of twelve or thirteen slabs, of medium and small sizes, set up on edge and covered with two large slabs suspended about



Fig. 9. Stone Grave in Rock-Shelter on Green River near Bone Cave.

one foot above the bottom of the chamber, which was itself paved with small thin fragments of rock. Of the upright slabs there was one at the head (up-stream) and one at the foot which were exactly opposed and which in other respects appeared to be the principal rocks. The grave chamber was run practically full of solid earth, which when removed revealed the flexed remains of an adult female lying on the left side, head southeast, face southwest. The recovered parts of the skeleton are fairly well preserved; but, strange to relate, the lower jaw is missing. Probably no special significance attaches to this fact, however, because some of the larger bones show much evidence of having been gnawed and it is entirely possible that some rodent

25. Bows and arrows.
26. Poles cut with flint stones.
27. Rattlesnake skins.
28. Vegetable colors done up in leaves.
29. Deer sinews — and other minor objects.
30. Pottery vessels and fragments <sup>1</sup>.

This diversified list of cultural data speaks for itself and it is necessary merely in this place to point out to the reader two important facts concerning it. The first is that all but two or three of the above items were the accompaniments of so-called mummies; and the second is that while it is impossible now to find out how these mummies were disposed of in the caves, some at least were secreted in stone graves <sup>2</sup> of the identical type commonly met with in the aboriginal cemeteries of both Kentucky and Tennessee and beyond.

#### KENTUCKY GEOLOGICAL SURVEY DISCOVERIES, 1870-1875.

The comprehensive State Surveys of Kentucky, begun about 1870 under the direction of Professor N. S. Shaler, resulted in a new body of archaeological data being gathered from the Green River caves. On the scientific staff was the late Professor F. W. Putnam, serving in the capacity of naturalist. His work, as it happened, included a study of the cave fauna and while collecting this material his attention was forcibly drawn to the evidence of aboriginal visitation in the caves. Precisely what and how much of strictly archaeological work Professor Putnam really did is not quite clear; but Shaler, in his preface to the first memoir of the survey, especially announces a monograph by Putnam entitled: "On the Cavern Dwelling Races of Kentucky," with six plates. This paper unfortunately

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<sup>1</sup> The above items are abstracted mostly from notes and letters written under dates ranging from about 1813 to 1820, i. e., shortly after the discovery of several mummies in the Green River country. See bibliography under:

Flake, 303-304; Mitchill, 319-320, 321-323, 329-330; Putnam, (b), 323-328; Wilkins, 362-363; see also Collins and Jones.

The history of the collection is partly known. Prior to 1815 most of it fell into the hands of the American Antiquarian Society, Worcester, Massachusetts, where it remained in 1875 when Professor Putnam reviewed it. Since then the mummy and probably all of its accompaniments are said to have been turned over to the National Museum, Washington, D. C., where some of the material appears to be on exhibit, as I have recently seen fragments corresponding to items 8, 13, 17 and also item 24, i. e., the wooden bowl. This last is possibly the hitherto mythical specimen which gave rise to the name Wooden Bowl Room for one of the chambers in the Mammoth Cave. The National Museum acquired a collection of textiles said to have been found (about 1877) with a mummy in a cave eight miles from Mammoth Cave and which has been described and partly figured. See Holmes, (b), 34.

<sup>2</sup> Wilkins, 362; Mitchill, 318; Putnam, (e), I, 5: 21.



majority of them to Shawnee and Delaware Indians.<sup>1</sup> But we are not for the moment interested in ethnic associations. The wide range of interrelated cultural traits has been brought up merely to indicate that there are several independent lines of concrete evidence (aside from the somatic possibilities) by which the Green River people can be shown to have been members of the mound-building tribes and that the archaeological material collected, say in Mammoth Cave, need not necessarily be regarded as more than three or four hundred years old.

With this conclusion fixed in mind let us now proceed to an examination of the archaeological data discovered in the Mammoth Cave vestibule, data which it seems to the writer belong to a different stage of culture.

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<sup>1</sup> Thomas, 692, 697, 698, 700.

## MAMMOTH CAVE VESTIBULE.

### SITUATION.

The entrance to the world-famous Mammoth Cave is located in the bottom of a deep forested ravine which drains into the Green River from the left side, directly above the head of steamboat navigation.<sup>1</sup> The distance down the ravine to the river is about six hundred yards and the distance to the head of the ravine, i. e., to the top of the plateau, is something less than two hundred yards. The elevation of the entrance is a little over one hundred and ninety feet above the normal river level and about sixty-five feet below the surface of the immediately surrounding country. The general trend of the vestibule and forward end of the main cave passage is from the southeast to northwest, the entrance facing in the latter direction, down the ravine.

### ORIGIN AND NATURE OF ENTRANCE.

Whether there is any causal connection between the cave and the ravine does not particularly concern us, but the fact that the axes of the two practically coincide suggests the possibility that the ravine is in part due to the collapse of the forward end of the cave. In any case the present entrance is of secondary origin, having resulted from the collapse of the cavern roof due to the weakening by surface erosion in the bottom of the ravine directly above it. The rock and soil which fell produced a dam, as it were, across the passage and the modern visitor, to enter the cavern, simply comes to the bottom of the ravine, below the break, and walks down the steep slope of this débris. All the drainage coming down the ravine from the plateau now falls over the upper edge of the break and lands at the foot of the dam, but ultimately finds its way through this loosely packed obstruction and continues down the ravine to the river.

The position of the original entrance is of some concern to the archaeologist. It may have been either a couple of hundred feet farther down the ravine or it may have been through the entrance to what is known as Dixon's Cave, some three to four hundred yards to the north. If the old entrance

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<sup>1</sup> The cave is ordinarily reached over the Louisville and Nashville railroad by way of Glasgow Junction.

was only two hundred feet or less in front of the present one the cave inhabitants might possibly have lived in the vestibule, as determined, though the daylight reaching them would have been negligible. If, however, the old entrance was by way of Dixon's Cave then it is reasonably certain that the Indian did not camp in the Mammoth Cave until after the present entrance was formed. But whatever may be true about the old entrances — and it is by no means impossible that the two were open at the same time — the presumption is strongly against habitation at that early date.

#### AGE OF ENTRANCE.

The implied age of the present entrance is a pertinent question for discussion. Perhaps expert opinion might differ on this point although geologists acquainted with the facts of erosion and deposition would hardly deny a respectable antiquity. It is my own opinion that the entrance originated simply as a sink-hole. At the time the vault underneath was 25 to 35 feet high and the roof, when it collapsed, fell *en masse* to the floor of the cave passage leaving a deep hole, measuring about 35 to 70 feet, in the bottom of the ravine. Now from all reports this hole when first entered, over one hundred years ago, was almost completely filled with rock and timber and alluvium rolled or washed into it from the ravine above. There is no certain way of measuring such accumulation, but in view of the fact that the roof-break was near the head of the ravine and the amount of drainage consequently very limited, it seems a safe guess that it involved a really considerable period of time. How long, whether one thousand or ten thousand years, would suffice to choke the entrance to the Mammoth Cave we shall have to leave for others to decide: the archaeologist may rest satisfied for the present at least in the assurance that the age of the entrance puts no narrow time limit on the occupation of the cave by the early aborigines.

#### DESCRIPTION OF THE VESTIBULE.

Descending about thirty-five feet down the artificially created débris slope fronting the yawning entrance, the visitor finds himself on the floor of a large vestibule or antechamber. At the forward end this vestibule is about 40 feet wide and 18 feet high; but a glance rearward shows the ceiling to drop and the walls to draw in, so that at a point about two hundred feet from the entrance the passage is barely 15 feet wide and 7 feet high. Most of these facts are sufficiently apparent in the appended sketch plans (Fig.

10) of the cave, but it is to be specifically noted that the present condition is at least partly artificial, because the floor level has been raised very considerably at the front of the chamber and excavated for passage at the rear, through the so-called "narrows."

The vestibule is dry and comfortable, subject only to draught according as the out-of-doors temperature rises above or falls below the constant temperature of the cave. A small stream of water falls, as before stated, directly into the entrance and daylight at present reaches back about one hundred feet. If the entrance had faced southeast instead of northwest it would have been a most ideal place for aboriginal occupation, more ideal in fact than the long occupied Castillo Cave in Spain.

Knowing beforehand that the Indians had frequented the far interior of the cave, it was impossible while visiting the place in May to resist the idea that they had camped more or less permanently in the vestibule. Indeed the flint flakes found in front of the cave and part way down the entrance slope made it seem absolutely certain. However, the cave management informed me that the slope was graded not many years ago and that the vestibule floor had been raised and leveled by the addition of rock and cave earth brought from the interior. But Trustee Janin was interested and gladly consented to some trial excavations.

#### EXCAVATIONS IN THE VESTIBULE.

Before describing the work done in the vestibule it may be well to state that the investigation was intended to be of an entirely preliminary character. During the tourist season it could be nothing else. In the dead of winter, when visitors are few, it would be feasible perhaps to open up an extended area of the cave floor such as would be necessary in order to get down to any considerable depth. But the work was carried far enough to determine some highly important facts, so that until the general cave problem takes a new turn the Mammoth Cave may safely rest.

The excavations began in the bottom of the ravine out in front of the cave and extended down the entrance slope and for about 175 feet back into the cave, i. e., very close to the iron gate. Three series of trial pits were dug, one along the east wall, one along the west wall and one down the center of the front slope and floor space. Those outside the entrance promised little and were therefore not developed very far except in the case of a single trench near the top of the entrance slope. This yielded nothing whatever and the excavations were therefore soon confined to the middle section of the vestibule proper where camp refuse came to light in several

places. The accompanying floorplan and sections are designed to indicate the position and extent both of the relic-bearing débris and of the principal excavations made in it and near it.

#### EAST SIDE TRENCHES.

*Trench I.* Immediately inside the entrance there is a large "rockfill" in the floor through which the water pouring into the cave finds its way to the open ravine below. According to common report this fill occupies a depression "over twenty feet deep" a depression presumably created in part by the water carrying away the intermixed soil and in part by the water dissolving the limestone itself. As we could not expect to reach a depth of twenty feet or more, the first floor trench was located several feet inside the rockfill in what appeared to be solid cave earth.

The site selected was 37 to 47 feet from the entrance — i. e., the point at which the falling water strikes the floor — and about 10 feet from the east wall. It seemed a place at which any depth might be reached without difficulty, but at little more than 5 feet below the surface we struck the living rock, evidently the undercurving cave wall, and could go no farther. The formation encountered was a yellowish clay-like substance, seemingly identical with the leached saltpetre earth stacked in the interior cave. In the matrix were mixed rocks, occasional bits of wood, bone, etc. Evidently the material was filled in, possibly more than a century ago, when saltpetre was being produced in the cave and when a driveway for ox carts, etc., had to be made over the uneven rocky entrance floor.

*Trench II.* The second excavation was 58 to 73 feet from the entrance. It marked the point where the yellow clay of Trench I gave way to bedded materials of entirely different natures. One of these new formations, lying near the surface, turned out to be Indian camp refuse, but it was so loose and so devoid of bedding planes that I was unable to decide for awhile whether it was a primary or a secondary deposit — i. e., whether it lay as the aborigines left it or had been moved by modern man from some place in the interior. But after working the vertical breast back for a few feet stratification duly appeared. Lying partly beneath the loose extremity of this Indian refuse and partly beneath the adjacent yellow clay (see Sect. A-B in Fig. 10) was found a thick oblique stratum which seemed also to be refuse. It was a homogeneous muck-like substance, rather black in color and characterized by numerous small white specks which for a time were taken to be disintegrated shell fragments. There was much charcoal in it and at a depth of 9 feet was found a roughly flaked flint, but whether

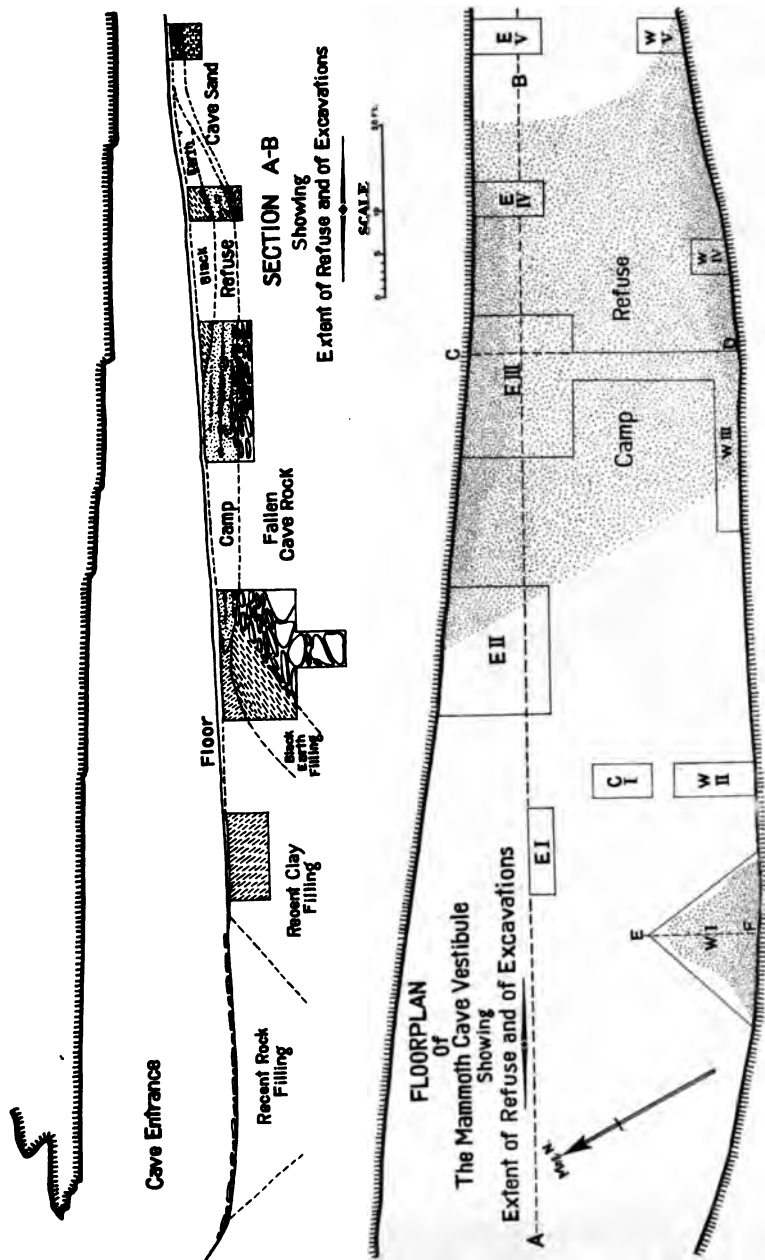


Fig. 10. Floorplan and A-B Section of Mammoth Cave Vestibule showing Extent of Camp Refuse and of Excavations.

natural or artificial would be difficult to say. In general appearance the formation seemed to be camp refuse, possibly of a very ancient date, and yet there were no animal bones, no shells, and no certain artifacts such as were found in the refuse above. On the other hand, the *débris* after awhile yielded bits of wood — apparently shingles — etc., and the conclusion finally reached was that it could be nothing else than modern *débris*.

Through this compact mass a trench had been cut, evidently a long time ago, and this trench was filled with all sorts of rubbish of a modern character. Beneath the whole we came upon broken rocks, at first small slabs and later great boulders. These latter were so large that it was impossible to carry the excavation below 10 feet, but the shovel could be let down through a crevice between two boulders fully 5 feet farther. Consequently, if there is any relic-bearing *débris* at this point in the cave entrance it is at least 15 feet below the present floor level.

*Trench III.* The next opening made in the cave floor began at a point 88 feet from the entrance and ended at 104 feet. This excavation was in

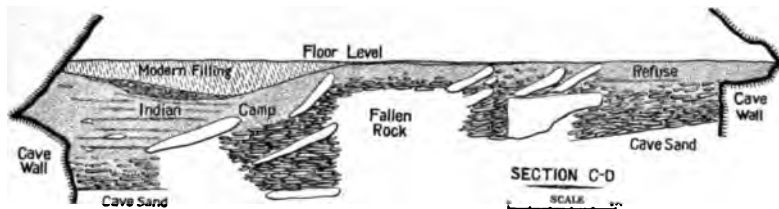


Fig. 11. C-D Section across Mammoth Cave Vestibule at about One Hundred Feet from the Entrance showing Order and Nature of Floor Deposits.

the heart of the relic-bearing deposit yielding a fair number of artifacts and for that and other reasons difficult to abandon. It was finally connected with an excavation along the west wall by means of a trench running clear across the cave (see floorplan, i. e., Fig. 10). The A-B and C-D sections (Figs. 10 and 11) of this excavation show the bulk of the distinctly stratified camp refuse to lie close to the east wall where in places it attains a depth of about 4 feet, while towards the center of the cave it thins out to a mere sprinkling. The forward end of the artificial stratum rises practically to the surface while the inner end dips under a sterile layer of what is probably, at least in part, modern filling. Limestone rock closely packed and placed in position as if dropped from the cave ceiling underlies the whole excavation, and the transition from camp refuse to clear rock is somewhat gradual. Over near the east wall the rock foundation consists of immense oblong slabs or blocks producing a sort of hollow shelf on which the greater portion of the camp *débris* lies. The main excavation was carried down into

the underlying rock mass, where possible, but in general only as far as the Indian débris had sifted, which was approximately 6 feet below the floor level.

*Trench IV.* The last east side trench to encounter the relic-bearing stratum was dug 116 to 120 feet from the entrance. It revealed conditions corresponding in a general way to those obtaining at the inner extremity of Trench III. Beneath the thin black surface veneer came first a 2-foot layer of sterile yellow clay, next a few inches of rock mixed with black earth, then the Indian refuse 2 to 3 feet in thickness, again a layer of rock, and finally a yellow laminated bed of fine sand, identical with the sand found in the interior of the cave. As the sand was apparently of aqueous origin it seemed useless to go any deeper. The noteworthy fact, shown in Sect. A-B, (Fig. 10) is that both the upper and under surfaces of the Indian débris rise towards the rear of the vestibule.

*Trench V.* The last trench indicated in the general A-B section conformed entirely with the suggestions of the preceding excavation. After passing through less than 2 feet of broken rock the fine sand appeared at once. This sand, as already stated, was carried to its place of deposition by flowing water and it is therefore very unlikely, in view of the position and general nature of the vestibule, that aboriginal remains are to be found beneath it.

#### THE WEST SIDE TRENCHES.

*Trench I.* This excavation, begun as a trench projected along the wall from about 20 to 40 feet inside the entrance, became a triangular cavity before it was finally abandoned. A glance at the general floorplan shows that a small pocket of relic-bearing refuse was found at this place. The accompanying E-F section (Fig. 12), taken at the point of maximum expansion of the débris, indicates a rather suggestive phenomenon. A layer of modern filling, consisting mainly of red clay, will be observed to cover the greater portion of the refuse; but for a distance of about 2 feet, next to the limestone wall, the plainly stratified Indian débris rises practically to the surface, attaining a depth of about 16 inches. The under surface of the débris is nearly level, resting as it does in part on a shelf of living rock covered with a trace of aqueous sand. Everything about the section is normal except the sudden drop of the upper surface of the refuse. The alternating layers of ashes and black débris are left hanging in the air, as it were. In other words, the indications are that a portion — probably the greater portion — of this refuse deposit has been removed. How this was done could not be verified but it seems most probable that it was accomplished



by the swirling waters of a pool created in the entrance to the cave perhaps at times of abnormal precipitation. Closer study of the section will throw some light on the amount of material removed. The white and dark streaks in the refuse section are observed to thicken and also to rise towards the right, i. e., in the direction away from the cave wall towards the center of the vestibule. This fact can mean only one thing, viz., that we have pre-

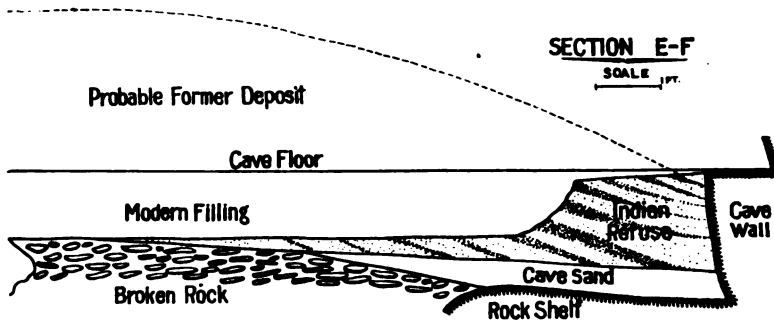


Fig. 12. E-F Section of Mammoth Cave Floor Deposits at about Thirty-two Feet from the Entrance.

served for us merely the shallow periphery of the original relic-bearing deposit. How large the deposit was, is of course impossible to say, but the evidence at hand seems to warrant the opinion that the Indian camped here for a long period of time. The mere fact that he camped so close to the entrance also suggests that daylight did not reach as far back in those days as it does at present. In other words, the array of facts here presented strengthens the opinion, already advanced, that the entrance to the cave was nearly closed by débris when discovered by the white man.

*Trench II.* We have now considered in some detail all the more important conditions obtaining in the various excavations and may therefore pass rapidly over the remaining trenches. The present cut extended from about 47 to 52 feet along the wall and, if we group with it the adjoining center excavation (C I on the floorplan) it reached practically to the center of the cave. From the wall for a distance of 8 feet the living rock was again encountered, only 2 feet below the floor surface; but farther out no bottom was reached. Our trench proper showed alternating layers of red clay, black refuse and even some ashes, but it was sterile and undoubtedly all of modern origin. In excavation C I came first one foot of red clay, next about a foot of broken rock and then red clay again, continuing to unknown depth. We penetrated only about 8 feet of the material, which was as in contiguous trenches of the nature of modern filling.

*Trench III.* This excavation commenced at about 80 feet from the entrance and ended at about 100 feet. It was merely a narrow trench 1 to  $3\frac{1}{2}$  feet deep. At 80 feet the floor was yellow laminated sand, at 85 feet the Indian refuse commenced with a thin wedge and at 100 feet it had attained a depth of 9 to 15 inches, as shown in section C-D. The débris rested on broken rocks down among which it had sifted for a foot or more.

*Trench IV.* This mere test pit, located at 109 to 113 feet from the entrance, revealed conditions similar to those on the opposite side of the cave. On top was found about 1 foot of red clay (modern filling), next 2 to 3 inches of clear Indian refuse, then  $1\frac{1}{2}$  feet of rock mixed with refuse, and finally clear broken rock, penetrated to a depth of only 1 foot.

*Trench V.* The last excavation to be mentioned was located at 135 to 139 feet from the entrance, exactly opposite Trench V by the east wall. It brought to light a very shallow deposit of camp refuse constituting the floor surface and lying on a rock foundation composed mostly of large blocks. The site marks the extreme inner end of the signs of habitation in the cave vestibule.

#### COMPOSITION OF CAMP REFUSE.

The deposit recognized as of aboriginal origin is composed mainly of ashes. In some of the sections obtained this substance occurred in a pure state as white lenticular streaks or beds; but as a rule it was mixed with other things — especially charcoal and presumably camp wastage of all sorts — which gave it a dull gray appearance. It was extremely dry and powdery. Omitting the artifacts proper, an ordinary ocular analysis of the refuse revealed the following components, listed in decreasing quantitative order:—

1. Ashes.
2. Charcoal.
3. Animal bones.
4. Fresh water shells.
5. Osseous human remains.
6. Fragments of sandstone — the so-called Chester sandstone.
7. A few waterworn pebbles.
8. Two or three small lumps of blue-green clay.
9. A small cemented lump of charred sunflower seeds.

The absence of bits of wood, corncobs, nutshells, etc., excited at first no particular thought. These things could have decayed, although one would suppose that objects of this character might have been preserved indefinitely under the conditions presented. But when potsherds as well

as all the finer examples of polished stone artifacts, common to the region, also failed to turn up, interest began to be aroused and consequently more of the refuse was worked over than was originally intended. Nothing availed, however, and the list submitted covers everything found. Of the items thus cited only a few merit further consideration.

*Animal Bones.* The osseous faunal remains taken out amount in quantity to barely half a cubic foot and the individual bones are for the most part fragmentary and therefore not entirely identifiable. The more obvious forms, as determined by Mr. H. E. Anthony and Miss Mary C. Dickerson, of the Museum staff, include: —

1. Black bear (*Ursus americanus*).
2. Virginia opossum (*Didelphs virginianus*).
3. Porcupine (*Erethizon dorsatum*).
4. Virginia deer (*Odocoileus americanus*).
5. Elk (*Cervus canadensis*).
6. Dog (*Canis* ).
7. Brown bat (*Eptesicus fuscus*).
8. Box turtle (*Terrapene carolina*).
9. Turtle (*Kinosternon* ).
10. Turkey (?).
11. Crane (?), and probably other birds.

If we compare this with similar lists published in recent years for Delaware,<sup>1</sup> Pennsylvania,<sup>2</sup> Ohio,<sup>3</sup> Kentucky,<sup>4</sup> and Missouri<sup>5</sup> sites, we note, aside from the paucity of species in the Mammoth Cave (due most likely to the limited amount of work done), a general agreement. Thus the bison is absent, as is usually the case in most of the archaeological sites east of the Mississippi River.<sup>6</sup> On the other hand, the bat has not before been reported, but as these creatures normally inhabit caves the presence of their remains here may or may not be due to human agency. The one possible new note appears to be the presence of the porcupine, although I am not in position to say that the Green River country is beyond the normal range of this animal. No fish bones whatever were discovered; but, strange as that may seem, it accords with findings elsewhere in the Ohio drainage, even where fishhooks are present.<sup>7</sup> Exceptions<sup>8</sup> do occur, however, and this, if anything, makes the rule all the more interesting.

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<sup>1</sup> Cresson, 148.

<sup>2</sup> Mercer, 156.

<sup>3</sup> Mills, (b), 32; (c), 26-32; (f), 78-82, etc.; Moorehead, (b), 98.

<sup>4</sup> Smith, 179.

<sup>5</sup> Peabody and Moorehead, 118.

<sup>6</sup> Regarding the question of the bison and his appearance east of the Mississippi see bibliography under Allen and Shaler.

<sup>7</sup> Smith, 180.

<sup>8</sup> Mills, (b), 50.

**Fresh-water Shells.** From scattered places in the refuse a little over 1 cubic foot of shells, mostly bivalve, were obtained, the majority of them in an unbroken condition. Among the lot I did not myself recognize more than four or five species and of those what I supposed to be a well selected series were brought away. To my surprise Curator L. P. Gratacap of the Museum Staff and Dr. Bryant Walker have out of this possibly incomplete selection made the following identifications: —

1. *Unio crassidens*, Lam.
2. *Unio gibbosus*, Barnes.
3. *Quadrula undulata*, Bar.
4. *Quadrula coccinea*, Hild.
5. *Quadrula rotundata* (*Q. tuberculata*, Raf.) Raf.
6. *Lampsilis recta*, Lam.
7. *Lampsilis ligamentinus*, Lam.
8. *Lampsilis ovata*, Say.
9. *Plagiola securis*, Lea.
10. *Cyprogenia irrorata pusilla*, Simp.
11. *Pleurocera canaliculata*, Say.<sup>1</sup>

Under the circumstances I shall venture no comments of my own, but will cite instead the pertinent remarks accompanying the identifications. "These shells," says Gratacap, "are not quite typically developed. They range somewhat under normal dimensions and exhibit features, in that respect, familiar to collectors in the Green River area, viz., a dwarfing in size with a moderate repression of the salient specific details. They do not, however, suggest any differentiation by reason of age from living species, and offer not the slightest criterion as to the period of their use and accumulation except that they do not postulate a very ancient date. In confirmation of the foregoing opinion, these words from Dr. Walker may be considered authoritative: 'Judging from the excellent preservation of the nacre I should presume that these shells are comparatively recent.'" The implications of these last remarks are perhaps at first a little startling. But, while admitting the correctness of the observations on the specimens in question, I think it well to reiterate that the matrix in which these shells were found was absolutely dry and subject to very little change in temperature. Under such conditions it would seem possible for the nacre and epidermis on a shell to have been preserved for a long time, if not indefinitely.

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<sup>1</sup> Cf. Mills, (b), 30-31; (c), 32; Smith, 180.

## HUMAN REMAINS DISCOVERED.

The skeletal remains found in the Mammoth Cave vestibule are few and fragmentary and apparently of no very special significance. Nine separate finds were made, all of them in the camp refuse proper and at widely different levels. The largest fragment, found in Trench W I, consists of the distal half of an adult left femur. No study or even description will be attempted other than to remark that the anterior portion of the patellar facet and the part of the shaft directly above present a notably deep longitudinal groove. In Trench E III were found the symphyseal portion of a left female pubis, a fragment of partly charred cranium, an adult metatarsal bone, one upper molar and two canine teeth, the left half of the lower jaw of a child with two milk teeth, and finally most of the osseous remains of a foetal burial. None of the bones exhibit traces of having been cut or scraped or crushed — in other words, there are no indications about them suggesting cannibalism though the isolated occurrence of fragments might easily lead to such a supposition.

## ARTIFACTS DISCOVERED.

The last and most important groups of data to be considered are the artifacts. In a sense, every particle of the refuse deposit is the work of man and our delimiting of certain elements of it as artifacts cannot but be arbitrary. Nevertheless, definition is a practical necessity and we regard as artifacts those objects which appear to have been intentionally worked or shaped for some more or less evident purpose, such as tools, weapons, and ornaments. The lateral distribution and material nature of these objects may be set forth in tabular form as follows: —

Trench	Volume	Bone	Flint	Shell	Stone	Totals
E II	20 cu. ft.	2	1			3
E III	400 " "	11	6	5	2	24
E IV	40 " "	4	1	1	1	7
W I	70 " "	4	3	2		9
W III	15 " "	6	1			7
Totals	545 cu. ft.	27	12	8	3	50

In addition to the tabulated specimens there are at hand about seventy flint flakes, presumably rejects, although many of them might easily have

been used for cutting and scraping. The bivalve shells might conceivably have been put to similar usage, but not for long or the fact would have been evident.

The table as a table may be left to speak for itself. The approximate volume of refuse handled has been added for the benefit of those who may desire to figure percentages, etc. Approximate data are also at hand for the different depths at which artifacts were obtained, but as there appears to be nothing especially significant about the figures and their publication would require a much more extended table they have been omitted.

#### OBJECTS OF BONE.

*Awls.* The commonest type of artifact is a more or less sharply pointed implement of bone or antler. Of such, the collection contains twenty-four examples and at least seventeen of these may be regarded as ordinary awls. Most of the specimens appear to be made from deer bones, although a small mammal and a bird are also represented. As regards workmanship the lot falls into two classes: (1) those improvised from accidental splinters of shank bones, and (2) those carefully shaped from selected bones. The improvised class is most numerous and shows a good deal of variation as to size and somewhat as to general finish or rather lack of finish. The carefully finished class is made generally from the metapodial or cannon bone of the deer — used either entire or halved or quartered. Two specimens are curved and slender throughout, i. e., with no accommodating butt, and may be needles with the eye portion broke off. All the typical forms are illustrated in Fig. 14 and are duplicated in the cited reports of both Mills and Smith.

*Chipping Tools.* Two of the implements (Figs. 14c and 14h) are less suitable as awls than as scrapers or chipping tools. One presents a broad square-cut point like a chisel, while the other possesses a similarly dull but rounded point. Their exact use is not apparent, but while it is conceivable that they are merely awls in process of manufacture they could no doubt have been used for purposes of chipping flint.

*Projectile Points.* Four short stout antler points were found, resembling the class of artifacts generally grouped under the designation arrow points,<sup>1</sup>



Fig. 13. Projectile Point of Antler from the Mammoth Cave Vestibule. Nat. size.

<sup>1</sup> Mills, (a), 27; (b), 41-42; (c), 51-53; Smith, 182, Pl. XXI, fig. 1-5.

though occasionally also labeled spear points. One of these, little more than  $1\frac{1}{2}$  inches long, may be a natural production; two are in process of manufacture, having been roughly broken off at the base and laboriously whittled down all over their surfaces (see Fig. 14g); and the fourth, a really finished form, is indicated on the accompanying sketch (Fig. 13). Unfortunately, the specimen itself disappeared from the collection not long after its discovery; but it was symmetrically cone-shaped, about  $2\frac{1}{2}$  inches long, and nearly 1 inch across the base. The outer surface was smooth and polished, the rim of the base very neatly cut with a perceptibly curving bevel, and the core hollowed out. The point of the object was partly destroyed through decay, but it appeared to have been only mediumly sharp. On the whole, it seemed a remarkably fine piece of work — rather too large, I should say, for an arrow point, but might no doubt have served as a spear point.

*Tubes.* The remaining articles of bone consist of two tubes or cut sections of bird bone — Figs. 14f and 14l. The smaller is made presumably from the humerus of a turkey. It is about 3 inches long and shows scarcely any signs of wear. The other specimen, possibly the leg bone of a crane, is about 10 inches long with one end cut off on a slant and the entire surface polished by usage.

#### OBJECTS OF SHELL.

*Spoons or Scrapers.* The commonest type of artifact under this heading consists of an entire half-shell of either *Lampsilis recta* or *L. Ligamentinus*, the ventral edge of which has been worn down and straightened by frictional usage (see Figs. 15a-b). The worn part is always on or near the end opposite the hinge, by which it was undoubtedly grasped; and it is of interest to note that all but one in a collection of five are adapted for the right hand. Some difference of opinion exists as to the use of such articles, their service either as knives, scrapers, or spoons having been suggested by previ-

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Figure 14. Artifacts of Bone from the Mammoth Cave Vestibule.

- a. (20.1-192) Pointed implement of antler.
- b. ( " -182) Pointed implement of bird bone.
- c. ( " -155) Chisel-pointed implement of deer ulna.
- d. ( " -154) Awl of ulna of small mammal, possibly lynx.
- e. ( " -190) Awl made from splinter of mammal bone.
- f. ( " -151) Tube or bead made from humerus of turkey (?).
- g. ( " -152) Arrow point (?) of antler in process of manufacture.
- h. ( " -175) Chisel-pointed implement made from ulna of young elk.
- i. ( " -174) Awl made from entire metapodial of deer — probably improvised from a worn-out skin scraper.
- j. ( " -156) Awl made from split metapodial of deer.
- k. ( " -184) Slender curved implement of mammal bone — possibly a broken needle.
- l. ( " -150) Cut and polished section of bird bone, 10 inches long.



14. Artifacts of Bone from the Mammoth Cave Vestibule.  $\frac{2}{3}$  Nat. size.





Fig. 15. Artifacts of Shell and Chert from the Mammoth Cave Vestibule.  $\frac{3}{8}$  Nat.

ous writers.<sup>1</sup> But while the employment of shells as knives and scrapers is a possibility, a study of the present specimens leaves little doubt that they served as spoons exactly after the manner in vogue among the Indians of northwestern California until quite recently, if not at the present day.

*Pendants.* Figs. 15d-e show two fragmentary bivalve shells (*Lampsilis recta* and *L. ovata*) which have been rubbed down on the outside and afterwards polished on both sides to a fair degree of iridescence. One has a single perforation some distance inside the ventral margin, very neatly executed by drilling from both sides. The other has been twice perforated near the dorsal margin, where, owing to the curvature of the shell, nearly all the drilling had to be done from the outside. The perforations in the latter specimens were studiously placed so that the shell would balance or suspend in a horizontal position and there can be little doubt that the former in its complete state was similarly perforated. Their use as pendants for necklaces, or something of that sort, can hardly be questioned.

*Unknown Form.* Fig. 15c shows a slender double-pointed object, worked out of the hinge portion of a *Lampsilis* shell. The specimen is two inches long and is suggestive of the substitutes for fishhooks used by the California Indians, but in this case there is no accommodating groove around the middle for attaching the string.

#### OBJECTS OF STONE.

*Chipped Arrow Points, Spear Points, and Knives.* In Fig. 15 are shown the entire collection of chipped points found in the Mammoth Cave entrance. As will be noted at once, the forms correspond closely to some of those found on the surface sites around the cave entrances and which are illus-

Figure 15. Artifacts of Shell and Chert from the Mammoth Cave Vestibule.

- a. (20.1-180) Spoon of *Lampsilis recta* shell.
- b. ( " -172) Spoon of *Lampsilis ligamentinus* shell.
- c. ( " -189) Unknown object of *Lampsilis* shell.
- d. ( " -169) Pendant of *Lampsilis ovata* shell, polished, perforated, fragmentary.
- e. ( " -170) Pendant of *Lampsilis recta* shell, rubbed, double perforation, fragmentary.
- f. ( " -163) Stemmed point of pinkish, jasper-like material; fragmentary.
- g. ( " -178) Stemmed point of mottled blue-gray chert; point end missing.
- h. ( " -159) Knife or accidental blade chipped from pinkish gray chert.
- i. ( " -164) Stemmed point chipped from dark gray chert; fragmentary.
- j. ( " -196) Stemmed point roughly chipped from an impure light gray chert; complete.
- k. ( " -185) Stemmed triangular point chipped from a fairly pure bluish chert.
- l. ( " -186) Arrow point roughly chipped from light gray weathered (?) chert.
- m. ( " -165) Stemmed point of streaked grayish chert; unfinished.
- n. ( " -179) Stemmed point of streaked grayish chert; roughly finished.

<sup>1</sup> Mills, (b), 22; (c), 70-71; Smith, 183, 189, 193, Pl. XXII, fig. 6.

trated in Fig. 1. Apart from difference in size, the specimens show only a normal variation in fundamental outline, all but one (?) being of the stemmed type; but the technique exhibited — or rather the degree of finish attained — varies considerably, though seemingly in correspondence with the nature of the material employed. A few of the specimens appear to be made of the type of chert or hornstone found in the interior of the cave and which has already been considered; others, however, are of foreign material of a less pure state, resembling jasper. The particular function of each is perhaps a matter of individual preference; but in all probability there are specimens suitable for each of the purposes suggested in the paragraph heading.

*Scrapers.* Among the seventy miscellaneous flakes already mentioned as found in the vestibule refuse, there are quite a number provided with straight razor-like edges which may have served as knives or to some slight

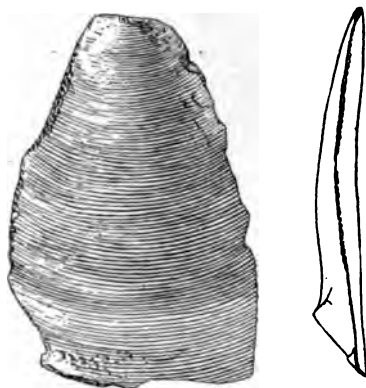


Fig. 16 (20.1-160). Small Side-Scraper from the Mammoth Cave Vestibule. Nat. size.

extent even as scrapers. Only a few, however, show unmistakable signs of usage, the evidence being a minute "retouch" or resharpening by means of secondary chipping of the cutting edge. Fig. 16 is one of these. It is a flake eminently suited for purposes either of cutting or scraping, but it is a fair question whether the fine chipping indicated is the result of design or merely of usage as a scraper. In common with the typical palaeolithic side-scraper (*racloir*), the chipping on these specimens is all — or nearly all — on one side of the flake; but unlike the European forms, it is here sometimes on the concave side, as, for instance, in the given illustration. The sum of the evidence seems to be that this particular specimen was a scraper and that if used in the right hand, as seems certain, it was brought down hard only in the motion or stroke away from the body of the workman.

But if the precise function of the above formless flakes remains doubtful,



there can be no question that the accompanying Fig. 17 represents a scraper. It is unfortunately the only specimen of its kind found in the cave débris; although, as we have seen, others approaching it in form were obtained around the entrance to some of the neighboring caverns.<sup>1</sup> Unfortunately, too, the drawings do not quite bring out its salient features. It is a roughly prismatic flake,  $3\frac{1}{2}$  inches long,  $2\frac{1}{4}$  inches across, and as much as  $\frac{3}{4}$  of an inch thick; but blunt at one end (though not well suited to the hand) and sharp-edged at the other end, having been retouched or chipped on the convex side. Possibly it is only a fragment of the original implement; but in either case

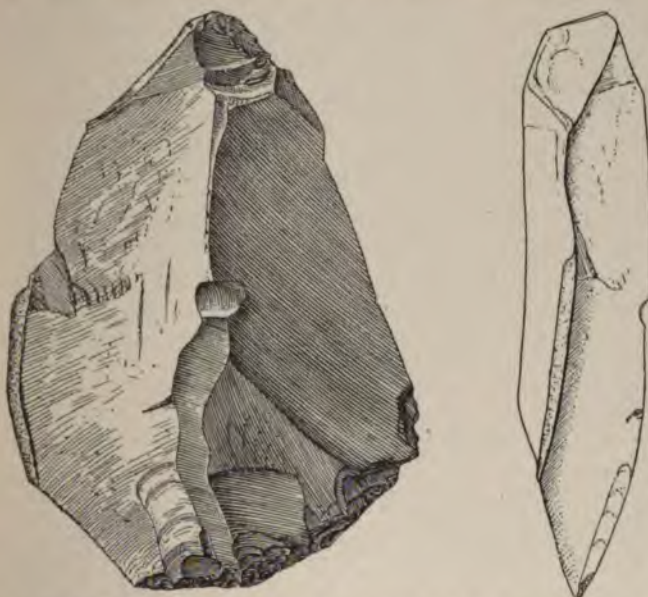


Fig. 17 (20.1-166). End-Scraper from the Mammoth Cave Vestibule. Nat. Size.

it bears a strong resemblance to the European end-scraper or *grattoir*, which was supposedly used after the manner of our modern plane, in contrast to the side-scraper (*racloir*), which could be made to remove shavings with both the forward and backward strokes.

*Pestles.* The remaining stone implements to be described consist of three pestles, illustrated in Fig. 18. All are of limestone, one having been improvised from a slender oblong block and the others purposely shaped by a pecking process, the evidence of which is still visible. Fig. 18c, the impro-

<sup>1</sup> See p. 18 (Fig. 1 k).

vised specimen is 9 inches long, quite irregular in outline, and has a rounded base or grinding surface as if it had been used in a common mortar. The designed forms, on the other hand, are somewhat symmetrically cone-shaped, with much expanded bases and perfectly flat grinding surfaces. One measures about 5 and the other barely 6 inches in length, and the grinding surfaces — though now much reduced by fractures — originally attained diameters respectively of 3 and  $3\frac{1}{2}$  inches. Neither could have served the ordinary mortar, but was designed rather for use on some flat-surfaced anvil rock.

Work had progressed for some time before these specimens turned up and I was almost ready to conclude that the culture stratum in the Mammoth Cave vestibule antedated the discovery of the rubbing and pecking processes. To be sure these are crude specimens, made of rather poor material, but the more elaborate bell-shaped forms are, if not common, yet typical of the Kentucky region and beyond.<sup>1</sup> Just what the presence of the pestles implies I am at a loss to say. "Mortar holes" are said to occur in the surface of the living rock exposures in the Green River country; and, as already stated, corncobs have been found repeatedly in the interiors of the local caves. But if these various suggestions signify that maize was cultivated by the people who inhabited the Mammoth Cave vestibule, then it is extraordinary that no other evidence was found in support of the fact.

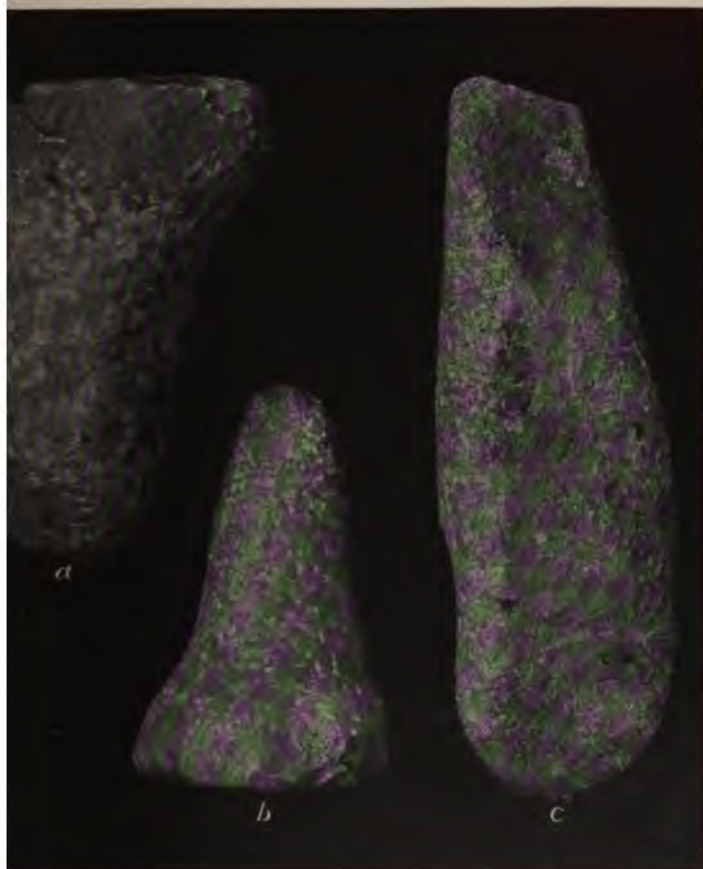
#### ABSENT TRAITS OF CULTURE.

Having now considered in some detail the evidences of aboriginal activities found in the Mammoth Cave vestibule refuse, it seems in order also to mention some of the cultural remains commonly found in Kentucky archaeological stations but which were here absent. Maize has just been suggested as one such item. In a charred state traces of this food staple should have been preserved indefinitely and under the given physical conditions it would seem as if these traces might have kept for a very long time even if not charred. However, no uncarbonized vegetal substance of any sort was discovered.

In the second place, no pottery was found. This is a remarkable fact inasmuch as ceramics are reported as tolerably frequent at least in northern and western Kentucky. We know that pottery occurs in the Green River country because it was found by the writer, as already described, in a rock shelter only three miles from the Mammoth Cave and we have it cited in

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<sup>1</sup> Young, 105; Moorehead, (c), 98, 102; Fowke, 88.



*a* (20.1-167), *b* (20.1-178), *c* (20.1-168). Pestles from the Mammoth Cave  
Nat. size.



Col. Young's list of specimens as occurring also in the interior of the Salts Cave. Its absence in the Mammoth Cave vestibule was noted from the beginning and excavations were prolonged beyond the original intentions with a special view to make sure on this point.

In the third place, no stone artifacts of the strictly polished types were found. The two or three pestles mentioned constitute the only specimens exhibiting the so-called purely neolithic workmanship. Celts, pipes, chunky stones, and all that great variety of problematic forms typical of the mounds and village sites of the general region are absolutely wanting. But, while this is true, it is proper to remark also that so far as the concrete evidence goes, these same artifacts are all but wanting both in the surface sites around the caves and in the interiors of the caves. Col. Young's collection list includes three specimens only from the interiors of the caves, while from the surface sites we have only a few finds reported on hearsay.

In the fourth and last place, objects of copper and other metals were likewise not met with at all, although they occur in mounds and in stone graves throughout that whole section of the Mississippi Basin. But again it should be stated that copper objects have not been reported from the cave interiors.



## SUMMARY AND CONCLUSIONS.

The substance of the preceding details concerning the discoveries in the Mammoth Cave entrance vestibule appear to establish:—

1. That the present entrance is of considerable antiquity.
2. That aborigines camped in the vestibule at two different places, leaving *débris* sufficient to indicate a relatively long period of occupancy.
3. That the shellfish and vertebrate remains found in this *débris* belong to existing species, though they appear to antedate the coming of the bison.
4. That cannibalism may have been a feature of their life.
5. That the artifacts of bone, stone, and shell, so far as they go, correspond in the main, quite closely to those of the neighboring surface sites and also to those of the mounds and village sites elsewhere in the Ohio Valley, but
6. That all traces of maize growing, pottery making, and the production of polished stone implements characteristic of the Moundbuilder culture as a whole are entirely absent.

It might be urged that 545 cubic feet, more or less, is a small quantity of *débris* to have handled. Still, taking into consideration the range of the test pits, the amount of work done seems sufficient on which to establish at least a tentative conclusion. Again, it might be said that the apparent outcome is accidental; but in view of essentially similar discoveries in the Jacobs Cavern<sup>1</sup> of Missouri, in the Naaman Creek Rock-shelter<sup>2</sup> of Delaware, and also in a whole series of rock-shelters in upper New Jersey<sup>3</sup> and lower New York states,<sup>4</sup> it seems to the writer far more than probable that the facts related about the Mammoth Cave vestibule settlement are exactly what they seem. That is, we have here evidence of a type of culture very similar to that of the Stone-grave and Mound-building tribes, but much more limited in its scope of development; in other words, essentially more primitive. The primitive group lived off the natural products of the land and the advanced group gained subsistence mainly through the practice of agriculture. Whatever the racial connections may be, the cultural relations are plain enough: the Mammoth Cave vestibule culture antedated and in a measure at least gave rise to the culture of the Moundbuilders.

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<sup>1</sup> Peabody and Moorehead, 24, 27.

<sup>2</sup> Cresson, 147.

<sup>3</sup> Schrabisch, 153, 165.

<sup>4</sup> Harrington, 130.

This conclusion, it may be remarked in closing, is in no sense at variance with what we already know. Professor Mills, for instance, after many years of mound investigation in the Ohio Valley has only recently announced the determination of *lower* and *upper* stages to his so-called Hopewell culture.<sup>1</sup>

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<sup>1</sup> Mills, (h), 266.

## GENERAL CONCLUSIONS.

Detailed conclusions have been stated at the end of each of the special divisions of the Green River archaeology herein treated and it is deemed needless repetition to cover the ground again. Altogether, we have considered data from four different sources, namely: (1) surface sites adjoining several well-known cave entrances, (2) the interiors of these and other caves, (3) the entrance vestibule to the Mammoth Cave, and (4) one small rock-shelter. We reached the conclusions that the surface sites are probably workshops where the chert, quarried in the respectively adjacent caverns, was fashioned into implements; but that the specimens themselves, while exhibiting both common and uncommon traits, cannot be dated as they may range over the whole period of aboriginal time. We found the remains from the rock-shelter and from the cave interiors (the latter being the accumulation of a whole century of collecting activity) both to be identical in nature with remains reported from the stone graves and the earthmounds of the entire east-central portion of the Mississippi Basin; and to be in all probability of relatively modern, though perhaps prehistoric date. Finally, we came to the conclusion that we have discovered in the Mammoth Cave vestibule a closely related but earlier and more primitive stratum of culture; but which, nevertheless, in view of the associated modern fauna, cannot be looked upon as particularly ancient.

In conclusion, then, so far as the antiquity of man in America is concerned, nothing essentially new or important has been added to what we already know from other caves, from the Trenton deposits, and from the Florida shellmounds. Omitting the Trenton station as perhaps debatable, we find conditions everywhere else in this substratum of culture to be about the same. On the one hand, there is the absence of pottery and of maize as well as of the advanced polished stone technique; and on the other hand, there is the continued presence of the historic fauna. We may be dealing with cultural developments stretching over some thousands of years but certainly not with anything reaching back anywhere near to glacial times.

But while we may be frankly skeptical about discovering anything more ancient or primitive in eastern North America than that which we already possess, it does seem highly desirable to continue cave investigation in Kentucky and elsewhere until we find our successive culture stages in actual superposed contact.

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**BY**

**N. C. NELSON**



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**CHRONOLOGY IN FLORIDA.**

**By N. C. NELSON.**



## INTRODUCTION.

The following brief paper concerns chiefly a large shellmound situated, until recently, on the mainland bank of the Indian River at Oak Hill, Florida. It is a report based upon only a few days' single-handed work, resulting in but a very small collection, and as such lays claim neither to completeness nor to entire accuracy of details, but insists merely on a few important general conclusions with reference to local chronology.

Physiographic conditions of the Gulf Coast region, and particularly of the State of Florida, have from times presumably long prior to the advent of man been exceedingly favorable to molluscan forms of life; and this fact of an abundant and easily secured food supply appears to have outweighed the concomitant scarcity of other important natural resources and to have attracted early aborigines on a large scale. The evidence of this is an immense number of refuse shell-heaps, often of enormous proportions, piled up along both the fresh and salt water shores, such as the St. Johns and Ocklawaha rivers with their lacustral expansions of the interior, the Indian River on the Atlantic Coast and, for example, Tampa Bay on the Gulf Coast. The presence and significance of these mounds have long been recognized, at least by the scientific world; and they have been subject to repeated investigations by such well-known men as Brinton, Cushing, Wyman, and Moore, until it seems questionable whether further work short of prolonged systematic study can reveal to us anything new about them. Nevertheless, when Dr. E. H. Sellards, State Geologist in Tallahassee, wrote the American Museum about the middle of April, 1917, that a certain large shellmound was being rapidly removed for road-building purposes and that it afforded conditions suitable for stratigraphic observations, it seemed an opportunity not to be neglected. Accordingly, I visited Florida, inspecting among other things of antiquarian interest, a group of artificial sandmounds on the shore of Lake Jackson near Tallahassee, also the now much-discussed archaeological station at Vero on the peninsular east coast, and lastly, quite a number of shellmounds, as well as sandmounds, between that point and St. Augustine, devoting finally three days to a special study of what remained of one such mound at Oak Hill. The results appear not to be entirely new; but as they were obtained independently, while in the possession of only a hazy and fading second-hand notion of prior determinations, they seem worth placing on record.

N. C. NELSON.

May, 1918.



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## SITUATION OF THE OAK HILL SHELLMOUND.

The shellmound site in question is located about one mile due east of Oak Hill station, directly on the bank of that part of the Indian River known as Mosquito Lagoon.<sup>1</sup> The so-called river owes its lagoon-like appearance mainly to the absence of islands which ordinarily crowd the broad channel separating the mainland and the sand-covered reef marking the present ocean shore, some four miles away. The spot will be recognizable for a long time to come owing partly to the fact that the shell material extends in places to a considerable depth below the ground water level and therefore could not be entirely removed. Specifically stated, the refuse deposit is situated on the southern extremity of a low and narrow sand bar, perhaps nine hundred yards long. A smaller shell-heap,<sup>2</sup> surmounted by a house and grove, marks the northern end of the same bar. This sand bar, it may be explained, is separated from the mainland jungle by a marsh belt about 150 yards wide. A powerful spring rises immediately off the land-side base of the mound and may possibly have had something to do with the choice of location although the water at the present time, besides being sulphurous, is decidedly salty and unfit for use. A few steps to the northwest of this spring is another smaller accumulation of shell and refuse measuring some 50 by 75 feet on the horizontal and about 10 feet in height. Some digging has been done in it and current reports are that human remains and artifacts are commonly found here. Possibly it is the burial place belonging to the settlement, although the composition does not differ noticeably from that of the main mound.

The recent history of the Oak Hill shellmound is in part suggested by the various local names applied to it, such as Sheldon Mound, Sam's Mound, and Hotel Hill. It appears to have been levelled somewhat and to have been subject to cultivation at a relatively remote historical date; in fact it was said at one time to have supported a valuable orange grove.<sup>3</sup> Whether

<sup>1</sup> The site is indicated as "No. 2" on a map of the local shellmound distribution recently published by Amos W. Butler. See bibliography.

<sup>2</sup> The mound was apparently observed by William Bartram about 1774 and again shortly to 1884 by Andrew E. Douglas, the donor of the American Museum's type collection of North American stone implements. See Bartram, 519, and Douglas, 79.

<sup>3</sup> No. 3 on the Butler map.

<sup>4</sup> Orange groves, according to early travelers, as well as recent investigators, are commonly met with on the shell-heaps in the interior of Florida. These groves, long neglected and essentially "wild," resulted presumably from seeds of European origin either accidentally scattered or deliberately planted by the aborigines in early historic times, the fruit being apparently more or less sour perhaps in proportion to the degree of reversion. See Bartram, 101, 138, etc.; Wyman, (b), 10; Moore, (a), 1894, 16.



this is true or not, the mound did within the memory of people now living serve as the site of a conspicuous hotel, visible for miles up and down the river. No actual ruins remain to prove this; but bits of glass, iron, porcelain, etc., were sufficiently evident in the upper two feet of the mound material to corroborate the tradition.

#### GENERAL DESCRIPTION.

On arriving at Oak Hill, only about one-seventh of the original shell-mound remained. Two steam shovels had been at work for four months and nearly two thousand carloads of shell had already gone out. However, the apparent basal perimeter of the refuse heap was easily made out and the accompanying groundplan (Fig. 1) will give an approximately correct idea of the size, shape, and orientation of the great accumulation. The small triangular portion of the mound still undisturbed ranged from the fairly constant ground water line up to a height of eighteen feet; and within the limits of this eighteen foot contour, on the north exposure, i. e., at the point marked X on Fig. 1 and on the A-B section of Fig. 5, the shell refuse extended fully four feet below the same water level with every indication of deepening in the seaward direction. On the other hand, it obviously rose in the landward direction as was proved by excavations at points Y and Z, as well as by the actual appearance of the sand bottom above the ground water line a little farther to the west. In other words, stating the case in rough terms, about one-third of the land-side portion of the mound material rested on the high median portion of the sand bar, possibly as much as a foot and a half above the ground water line, while the remaining two-thirds of the mound lay on the seaward slope of the bar, attaining progressively greater and greater depth from center to perimeter. The general facts of the situation are exhibited in the A-B section of Fig. 5.

If now we assume an approximate stability of the sea level throughout the human period and also assume that the mound accumulation was begun on dry land with only gradual growth in a seaward direction, then I did not see the original core, i. e., the oldest portion of the deposit. This of course was most unfortunate, as it leaves the stratigraphic observations somewhat incomplete.

#### INTERNAL STRUCTURE.

That the oldest portion of the Oak Hill shellmound had been removed already prior to my arrival will be made tolerably evident by an examination of either the accompanying sketches of the A-B and C-D sections (Figs.

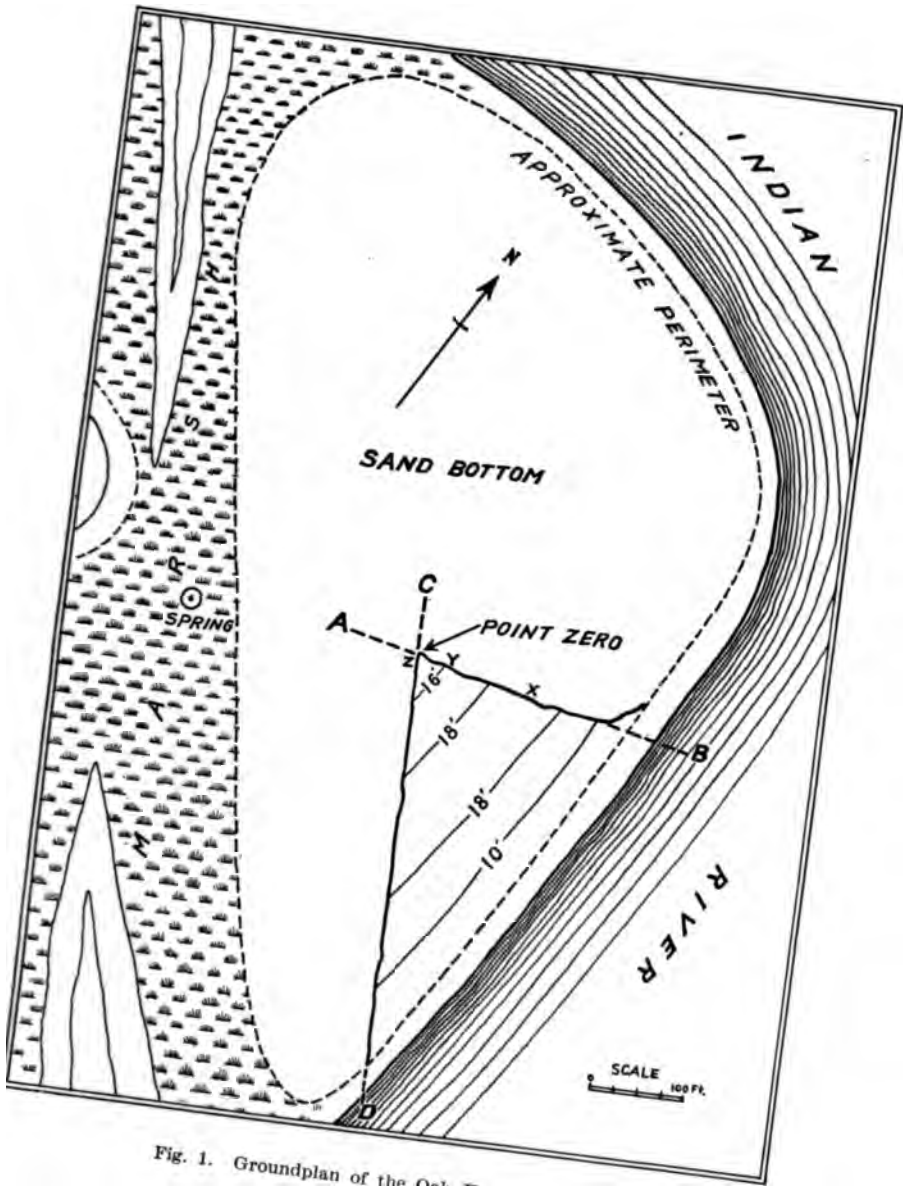


Fig. 1. Groundplan of the Oak Hill Shellmound.

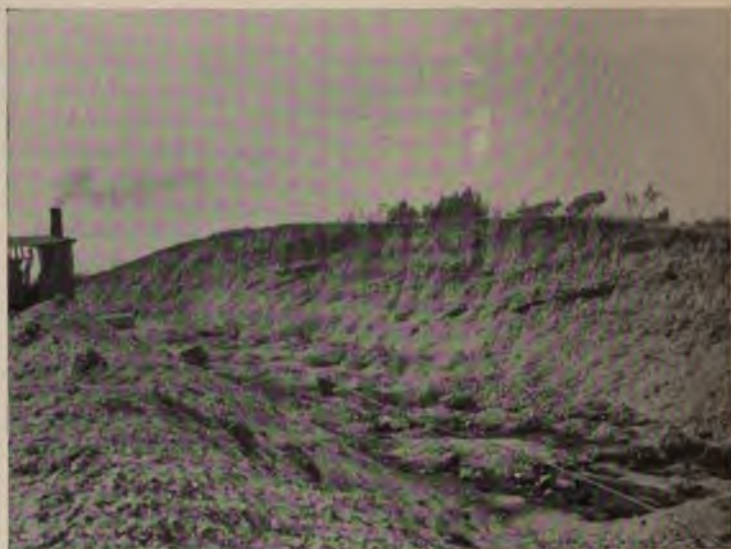


Fig. 2. Nearly Complete View of the North Exposure or A-B Section of the Oak Hill Shellmound.



Fig. 3. Partial View of the West Exposure or C-D Section of the Oak Hill Shellmound.

) or of the partial photographs of the same exposures. The plainly visible ark seams or strata, both in the transverse and the longitudinal section, all dip from the central end of the exposures towards the perimeter. This fact is best shown in the photograph of the transverse A-B section (Fig. 2) where two well-defined black layers are seen to begin at the top of the mound in the upper right hand corner and to reach the base level only about one hundred feet away, where they dip beneath the water level. The longitudinal C-D section (Fig. 3) is not quite so simple and regular, but the appended sketch-plan may be relied upon to show the essential features which tell a story of growth quite in accord with that of the companion section. Photographic illustrations of detail portions of the sections might also be submitted to show that the minor bedding planes of any and all parts of the composition conform entirely to the conspicuously outstanding stratigraphy.

These distinctive structural features, it will readily be perceived, are elements of the first importance as regards both the estimation of the period of time involved in the accumulation of the mound material and also the determination of the relative antiquity of the artifacts found in it. Comparatively speaking, the Florida shellmounds give the impression of having grown rather rapidly. Animal bones and artifacts — excepting pottery, perhaps — are notably infrequent and the same is true to a lesser degree of ashes and associable evidences of permanent settlement. In other words, by far the greater portion of the mound material is made up of absolutely clear shells, dumped out on a grand scale after having been emptied of their edible contents. Referring to the Oak Hill mound, the deposition of shell refuse was so rapid in places that there was no time for wind to blow into it or for disintegration to take place allowing vegetation to get a foothold. But a closer examination showed here and there distinct particular beds of calcined shells or of clear ashes and additional fine-grained refuse other than shells. These special deposits doubtless marked points of temporarily arrested accumulation of shell débris and were, besides, the repositories of most of the artifacts found in the mound. Protracted investigation of such fireside deposits would probably have revealed that any of them were actual house sites, suggesting that while the inhabitants lived on these spots shell refuse was thrown elsewhere. But in time, the houses were moved, or fell into disuse and gradually the hollows marking their locations were covered up; and so the mound grew by addition, now here and now there.<sup>1</sup>

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<sup>1</sup> An interesting illustrated sketch of probable shellmound growth on the Florida west coast is given by Walker, 1879, 414-418.

The visibly extended black strata of nearly uniform thickness (See Fig. 2) are of a somewhat different nature. They were given no very special attention, but it is hardly to be questioned that they represent for the most part long periods of arrest in the growth of the mound during which the black matrix was formed partly by disintegration and partly by vegetal deposition, precisely as is taking place at the present surface of this and other mounds. So while the first impression regarding the relative rapidity with which these shellmounds have accumulated still holds, the closer examination cannot fail to emphasize the idea that the mounds may after all lay claim to a really respectable antiquity. Incidentally, it may be in place to remark that many of the Florida shellmounds not far from this one have been abandoned long enough to allow the growth of trees upon them estimated to be over six hundred years old.<sup>1</sup>

The suggested relation of the stratigraphy to the age of the imbedded artifacts need hardly be dwelt upon. In ordinary geological formations of a stratified nature a given fossil specimen — barring accidental intrusions — is accepted as being at least as old as the formation itself; and under certain conditions depth is an index to age. The same rule is to be observed in shellmound investigation. But unless we take strict account of the order of deposition, the depth at which a given artifact occurs may signify little or nothing. Thus, to illustrate from the A-B section of the present mound, the fragments of pottery found in the bottom at point X, — i. e., twenty-two feet below the mound surface and four feet below the water level — were in reality no older than other sherds found on top of the mound at point Z.

#### SHELLMOUND COMPOSITION.

The composition of the Oak Hill shellmound cannot be given except in very general terms. No effort was made at exact determinations although deliberate attention was given to the subject. Roughly stated, then, probably all of eighty-five percent of the material in the mound was shell. Of the remainder considerably over fourteen percent was made up of ashes, charcoal, sand, rock, and other mineral substances; while the balance, less than one percent, would suffice for the volume of fish and animal bones.

*Shell Remains.* Referring to the molluscan remains alone, it cannot be far from the truth to state that about ninety percent of the whole mass was made up of oyster shells with perhaps five percent of clam shells and one half of one percent, more or less, of additional species to complete the

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<sup>1</sup> Wyman, (b), 81-85.

total volume. The shell collection brought home (Cat. No. 20.1-225) includes at least all the more obvious forms and it has been identified by Curator L. P. Gratacap as follows:—

1. Common oyster (*Ostrea virginica*, Gmelin)
2. Common hard shell clam (*Venus mercenaria*, Linn.)
3. The heavy ark shell (*Arca ponderosa*, Say)
4. Cockle shell (*Cardium muricatum*, Linn.)
5. Large cockle shell (*Cardium magnum*, Born)
6. Cross-barred Venus shell (*Chione cancellatum*, Linn.)
7. Wedge shell (*Donax denticulatus*, Linn.)
8. Tulip band shell (*Fasciolaria tulipa* Linn.)
9. (*Fasciolaria distans*, Lamm)
10. Pear conch (*Fulgur pyrum*, Dillwyn)
11. Short razor shell (*Tagelus gibbus*, Speng)
12. Plaited horse mussel (*Modiola plicatula*, Lamm)

For the sake of completeness there might be added to the list one or more species of crab (not determined) and also isolated finds of *Fulgur perversa*, Linn.; *Oliva litterata*, Lamm; and *Ampularia hopetonensis*, Say (fresh water). The mere naming of these invertebrates must suffice in the present case. Perhaps instructive results might have been obtained by investigating their relative frequency in different levels of the mound; but this was not done chiefly because the possible variation was not immediately obvious. One could not fail to observe that, e. g., *Venus mercenaria* and *Donax denticulatus* occurred generally in special pockets and minor intercalated strata; but a closer examination revealed that the former of these and at least most of the other species were represented from top to bottom of the refuse. Moreover, Curator Gratacap assures me that the cited forms are all representative of living species.<sup>1</sup>

*Mineral Substances.* In addition to ashes and charcoal, there may be mentioned such occasional items as smooth pebbles of undetermined rocks and also fractured chunks of limestone. But objects of this nature, inasmuch as they form no part of the local environment, are naturally infrequent. Of interest, perhaps, was a workman's detailed description of what would seem to have been a lump of ambergris, found and disposed of before my arrival. Intercalated strata of what was probably wind-blown sand were not so noticeable here as in neighboring shellmounds, but traces occurred. In the lower three feet of débris nearest the mound center, a great deal of

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<sup>1</sup> The cited literature appears to give no similar lists of the Florida coast shell species suitable for comparison; and the isolated references that occur are mostly to those forms only which happen to have been used for artifacts.



sticky mud or clay adhered to the outside of the shells, which were in addition somewhat cemented together. A thin film of mud had also been deposited on the inside of the same shells, presumably through the action of the extra high tide waters rising and falling through the mass, as indeed there were evidences of wave action elsewhere in the débris at points four to six feet above the present ground water level. The presence of the mud on the outside of the shells may possibly signify that the early mollusc-gatherers did not take the trouble to wash their bivalves before opening them.

*Vegetal Substances.* Under this heading nothing in the way of agricultural products such as corn, beans, and the like, was observed. In all probability, they were not present. The only possible remains of food substances were a small collection of what appears to be charred palm berries (20.1-227) such as may still be seen on the common cabbage palm growing in the vicinity, and which I was told are sometimes eaten even at the present day. The occurrences were recorded in both sections, the sample brought away being taken from the west face, 245 feet from zero and nine feet below the surface.

*Animal Bones.* Osseous vertebrate remains (Cat. No. 20.1-226) were comparatively scarce in the mound composition. This was to be expected because the aborigines who accepted the conditions of Florida seacoast life evidently came primarily for molluscs. Fish remains, in the form of bones and scales, were by far the most plentiful, commonly occurring in pockets or in isolated seams of the shell matrix, as if the waste of great catches had been disposed of at once. Among the few bones of the collection Assistant Curator John T. Nichols has identified a shark and a catfish. Occasional bird bones of medium and large sizes were found, but they have not been identified. The remaining bones, according to Dr. F. A. Lucas, include a whale, one or two turtles, a deer, and the black bear, *Ursus floridanus*.<sup>1</sup>

*Human Bones.* No evidences of human burials were observed; and the

<sup>1</sup> Wyman, (a), 457 and (b), 78, gives a partially determined list of the local shellmound fauna including a bear, raccoon, hare, deer, otter, opossum, turkey, birds (undetermined), alligator, hard-shelled turtle, soft-shelled turtle, box turtle, gopher, catfish, gar-pike, whiting, and other fishes not determined. These forms were more or less common to practically all the mounds investigated by him on the St. Johns River a few miles to the west and north-west of Oak Hill. Moore, here and there in his extensive publications covering the same field, verifies Wyman's determination and in (a), 1894, 23, adds a dog and a lynx to the list. Several species such as the beaver, the bison, etc., though historically at home in Florida have seemingly not been recovered from the shell-heaps in identifiable form.

All the above vertebrates, it will be observed, are modern species, but Wyman, (b), 81, cites the occurrence, in four widely separated mound deposits of fragments of extinct fossil forms such as a horse, an ox, a mastodon, an elephant, etc., all of which he expressly recognizes as intrusive, i. e., as not properly to be regarded as contemporary with the list of species above cited.

intelligent workmen engaged in removing the mound material were unanimous in reporting that none had been found prior to my arrival. Human bones were present, however, as I found myself a section of an adult humerus (20.1-226) about six feet below the surface in the north exposure. It was a matter of common report also that there was discovered in the mound some years ago a single skull remarkable for the fact that a bone arrow point was fastened in the eye socket.

#### ARTIFACTS.

According to practically all accounts, the Florida shellmounds, unless actually used for burial purposes, contain few articles of human manufacture such as tools, weapons, and ornaments. Several explanations might be offered for this state of affairs. Thus, if our observation is correct that the shell refuse accumulated at a comparatively rapid rate, we should expect proportionately fewer artifacts. But while this is probably a real factor in the case, the environmental conditions are also to be considered. No rocks suitable either for hammering or cutting tools are present in the country. If the shellmound people lived permanently on these sites instead of coming to them seasonally from the interior piedmont region where rock could be obtained, they would have had to barter for some of these necessities and for the rest make substitutes of shell, as was done in the Pacific Islands. It is conceivable that a mere clam digger might have gotten along with very little in the way of weapons and utensils, but there is no reason for regarding the early Florida native as having lived on such a low plane. He used fire from the beginning; he managed somehow to take both fish and game; and he made pottery, which if not particularly ornamental, was of good and serviceable quality.

The Oak Hill mound appears to have formed no exception to the rule, so far as artifacts are concerned, unless we except broken pottery. To be sure, the negative verbal reports of workmen who have handled the mound material with steam shovels is of doubtful value. Nevertheless, it agreed with my own observations, which it must be admitted involved little more than a fairly thorough inspection of the two illustrated exposures, amounting to some three thousand square feet. At a few points only, nearest the center of the mound, was any actual digging done, and that in the practically sterile lowest horizon of the refuse. Besides, there were small areas in the upper horizons which could not be satisfactorily examined owing to the danger of caving. The results of picking the surface of the two exposures may be grouped as follows:—



*Bone Objects.* The only artifact under this heading taken out in my presence was a worked deer antler found in the bottom of the mound at point X on the north exposure. A well-defined groove had been cut around one of the secondary prongs about three inches from the tip, for some such purpose as a spear point. The specimen forms no part of the collection because the finder was unwilling to part with it. Another authentic find was a fine dagger-like object of hollow bone, about twelve inches long and

now preserved in the collection of Miss Zelia Wilson of New Smyrna.<sup>1</sup> Finally, we may mention again the "bone arrow point" found inserted in the skull referred to in the preceding section.

*Shell Objects.* Only three pendant-like objects were recovered and two of these are even doubtful. The two uncertain specimens are perforated *Arca* shells, one (20.1-222) found near the top and the other (20.1-223) near the bottom of the mound. The perforation has been made by removing the small cone projecting back of the hinge; but whether it is of artificial origin or not, there is no appreciable wear on either object.<sup>2</sup> The third specimen (20.1-221) is a flat oblong form cut out of a *Fulgar* shell and notched at one end for attachment (See Fig. 4). This object was found lying under an inverted earthenware food bowl to be described later, and the idea that it may have been used for opening bivalves is at least conceivable.

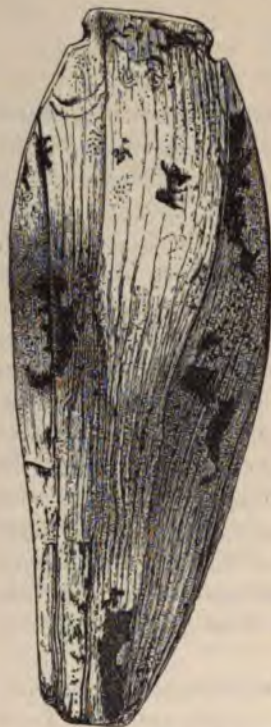


Fig. 4 (20.1-221). Pendant of Shell, found with Fig. 6.

*Stone Objects.* A thin artificially smoothened fragment of rock (20.1-224), resembling quartzite, less than two inches square, is all that the collection affords under this heading. This specimen was found in company with the preceding oblong shell pendant underneath a broken bowl at a point in the west section 150 feet south of the center and nine feet deep.

<sup>1</sup> The specimen is somewhat suggestive of the one figured by Moore, (b), X, 59, though neither perforated nor made of human bone.

<sup>2</sup> Cushing and Moore both found this type of perforated shell in considerable numbers on the west coast of Florida, and both regard them as artifacts employed for different purposes such as tools and net-sinkers. See Moore, (b), XIII, 470, for illustrations and text.

*Ceramic Objects.* Of the data gathered at Oak Hill, the earthenware or pottery alone seems to possess any really appreciable scientific value. Pottery of one sort or another was found at all levels in the mound except in the lower two feet or so nearest the original core of the deposit. Whether it was positively absent here cannot safely be affirmed on the basis of the small amount of work done, but the probabilities are strong in view of the repeated findings of Moore and Wyman in the St. Johns River shell-heaps.<sup>1</sup> Moreover, personal examination of an exposed twenty-five foot section through the Port Orange shellmound (No. 20 on the Butler map) some twenty miles to the north of Oak Hill, revealed pottery in the upper fifteen feet, but none in the lower ten feet. In other words, the range of evidence seems conclusively to show that the earliest stage of shellmound culture in east-central Florida was devoid of ceramics; and it is hardly to be doubted that the fact could have been fully proved by the present Oak Hill mound if it had been studied a few weeks earlier.

The ceramic specimens found projecting from the solid vertical walls of the two shell exposures, beginning at the angle of junction and ending at the ten foot contour, include both isolated sherds and several more or less complete, though crushed, vessels. One such vessel referred to in connection with the notched shell pendant was found in an inverted position in the west exposure 150 feet from the center and nine feet deep. Another and similarly inverted bowl, perhaps two-thirds complete, was located in the same exposure at ninety-five feet from the center and fifteen feet below the surface. Several less complete vessels were obtained elsewhere, some with drilled perforations, showing that the customary way of mending by tying the pieces together with cords was in use here also. Only a representative fragment of each of the noticeably incomplete specimens was taken and these were placed with the isolated sherds to be considered presently.

The one practically complete vessel brought home (20.1-218), on being mended, turns out to be an ordinary bowl, presumably used for food, but not to any appreciable extent for actual cooking. The specimen is indicated in Fig. 6 and may be roughly described as hemispherical, though the bottom is considerably flattened and the plain rim drawn in. Its inside dimensions are: height,  $5\frac{3}{4}$  inches; extreme body diameter,  $11\frac{1}{2}$  inches; and rim diameter,  $10\frac{1}{2}$  inches. The wall thickness averages  $\frac{1}{4}$  of an inch. A heavy buff-colored clay wash or slip has been applied to the inside of the vessel, but not to the outside, which latter shows a crackled surface as if the paste had not

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<sup>1</sup> See e. g. Wyman, (b), 53, 55, and Moore, (a), 1892, 916; 1894, 26; (b), X, 48, 102, 103, 209.

been thoroughly kneaded. The two surfaces of the vessel have been very roughly smoothened by scraping and rubbing with a small tool, leaving marks from one to three-sixteenths of an inch wide. The paste is an even dark gray or slaty color, fairly hard and well knitted, but at the same time slightly porous and seemingly stringy or laminated. Of tempering material, there appears to be at least a trace of finely ground shell.<sup>1</sup>

#### VERTICAL SEQUENCE OF POTTERY TYPES.

We come finally to the miscellaneous potsherds of which the collection contains 190 examples. The given figure represents by no means the total number of pottery fragments found, but instead merely so many localities in the two sections at which one or more specimens occurred. The list falls into two groups or classes, namely, plain ware and ornamented ware. To the class designated plain ware belong 113 sherds (20.1-219) taken from all levels of the exposures (excepting the lower two feet nearest the mound center), though they are most abundant in the middle and lower portions of the mound. The remaining 77 sherds, belonging to the ornamented class (20.1-220) were taken exclusively from the upper level of the refuse. Tables might have been constructed to show the exact distribution of the individual fragments; but, as previously intimated, the investigation was not sufficiently complete to warrant this, and the essential facts of the case have been approximately indicated on the two sectional sketch plans (Fig. 5). The broken lines crossing the upper and outer face of each of the two exposures connect the deepest occurrences in the refuse of ornamented ware; and while the general trend of these lines need not be taken as more than approximately correct, they will be observed to be in close agreement with the stratigraphy. The probable absence of pottery in the original core of the mound has also been indicated at the base of the center ends of each of the two sections.

This general fact of ceramic stratification, coupled with the total absence of pottery in the lower mound horizons, is of first importance and as such has been more or less evident to several prior investigators. Thus Wyman,<sup>2</sup> fifty years ago, clearly inferred that something of the sort was true

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<sup>1</sup> This vessel and in fact most of the fragments to be described later on seem to agree quite closely in regard to paste composition as well as to form and appearance with the characterization of one of the local earthenware types as made out long ago by other investigators. Thus Wyman, (b), 55, refers to the St. Johns River pottery as being generally "made of pure clay"; and Holmes, (a), 111, also (b), 117, recognizes in the same area what he calls a "chalky ware," or a pottery having a paste "exceptionally free from tempering ingredients."

<sup>2</sup> Wyman, (b), 53, 55.

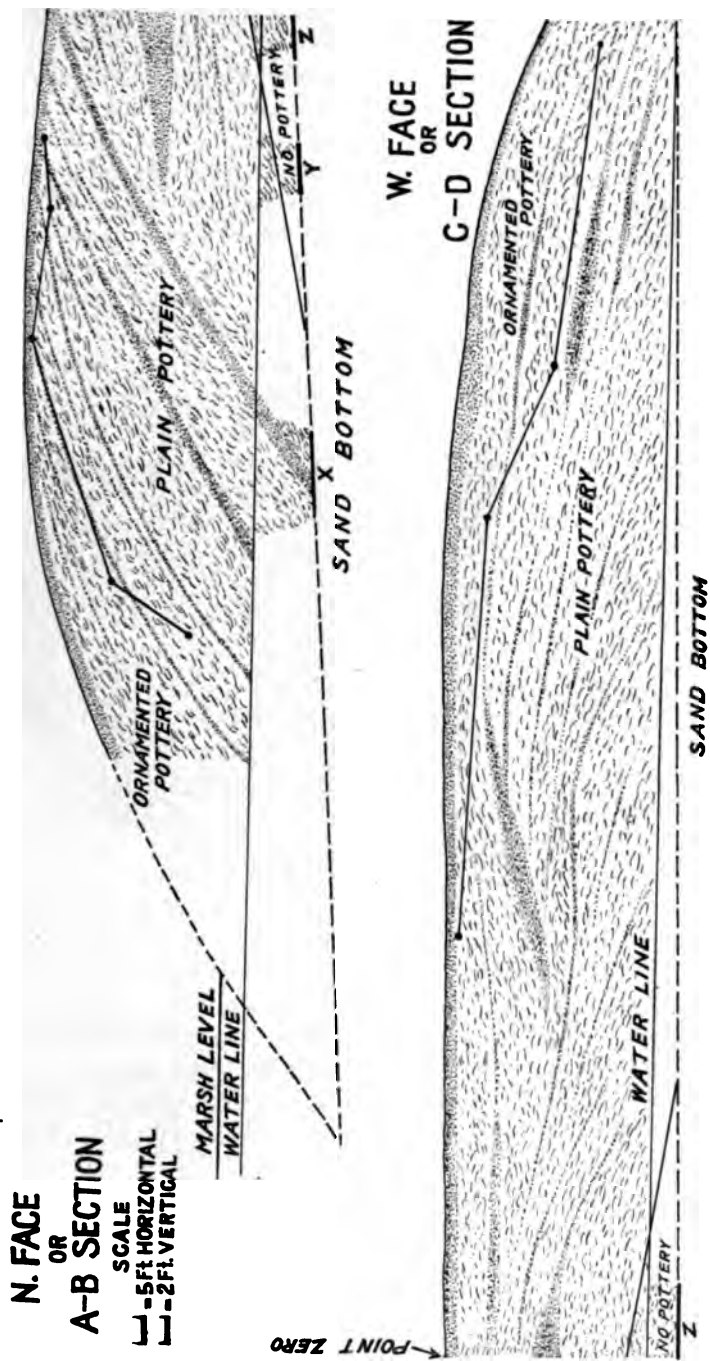


Fig. 5. Sectional Sketch Plans of the Oak Hill Shellmound showing the Stratigraphic Occurrence of Different Types of Pottery.

for the St. Johns area, though he did not demonstrate it. Moore,<sup>1</sup> on the other hand, states positively for the same area that ornamented potsherds occur often only on the surface or in the upper levels of certain mounds. Walker,<sup>2</sup> in 1881, published an actual section showing ceramic stratification in a mound near Cedar Keys on the Gulf Coast and Holmes,<sup>3</sup> in treating of the technical aspects of Florida pottery, has in various papers not only accepted these field observations, but has gone to the extent of recognizing several localized variations of decorated pottery some of which he either tacitly or expressly regards as of different relative ages.

*Plain Ware.* This division of the data has in a measure been described already in connection with the preceding bowl. But as the material is not of an entirely uniform nature a few additional remarks are necessary. So far as can be judged, the sherds all represent bowls or wide-mouthed pots of about the same simple form and size as the one described,<sup>4</sup> the only exception being Cat. No. 20.1-217, a fragmentary vessel with a flat circular bottom. Many fragments are encrusted with soot, usually on the outside, but occasionally on the inside as well. The general surface finish is about on a par with the bowl though there are some fragments of exceptionally thin and smoothly rubbed ware, mostly from the upper levels of the mound. Unfortunately, not a single piece gives a clear hint of how it was built up, whether by coiling or otherwise. The paste also conforms pretty generally to that of the bowl and one is under the impression that it was not fired quite sufficiently. Often, however, the typically chalky dark gray section is encased in red, and occasionally the section is brick red clear through. Tempering material is difficult to detect in most instances. Shell, if used at all, must have been very finely crushed. White crystalline sand, ranging from fine to medium coarse, is abundant in a number of pieces and crushed pottery appears to have been used in a few instances. The ware as a whole is firmer and of better quality than its general appearance would lead one to suppose.

*Ornamented Ware.* This group of material, except for its ornamentation, is in all respects practically identical with the preceding plain ware and the characters need therefore not be rehearsed. There is perhaps a slight indication of special developments in the rim, but that is all. The decoration therefore is our only concern. This embellishment is of one type from beginning to end and consists of a simple checker pattern, stamped on the

<sup>1</sup> Moore, (a), 1892, 916; (b), 156.

<sup>2</sup> Walker, 1881, 678.

<sup>3</sup> Holmes, (b), 116, 120-128.

<sup>4</sup> Holmes, (b), 121, including Fig. 57, comes to the same conclusion for the wares of the St. Johns River area. See also Wyman, (b), 53, 55.



outside of the bowl, presumably with a carved wooden paddle, such as is still used by the Cherokee.<sup>1</sup> But while the ornamentations are all of the straight-line order, a closer scrutiny reveals considerable variation. The normal pattern would result, let us say, from cutting into the face of the paddle two sets of equidistant parallel grooves so as to cross each other at right angles. By varying either the distance between the lines or the angle at which they cross, appreciably different results would be obtained. Thus the enclosed spaces between the crossing lines would become either square



Fig. 6 (20.1-218). Common Unornamented Food Bowl.

or oblong or lozenge-shaped, and their size might vary almost indefinitely. That the Oak Hill shellmound people appreciated this fact will be seen in Fig. 7 which gives the approximate range of variation in the material collected. All the suggested possibilities of form will be seen to occur and the size ranges from three to twelve elements (i. e., interlineal spaces) to the inch.<sup>2</sup>

Since the first draft of this report was written, the brief paper on some Indian River shell-heaps by Butler, already cited, has been issued. On page 106 the author states that he observed on the pottery from these

<sup>1</sup> For illustrations of the Cherokee checker stamp see Holmes, (b), Fig. 46 and Pl. 113.

<sup>2</sup> For additional illustrations of the checker-stamped ware see Holmes, (a), 115 or (b), plates 85, 109.

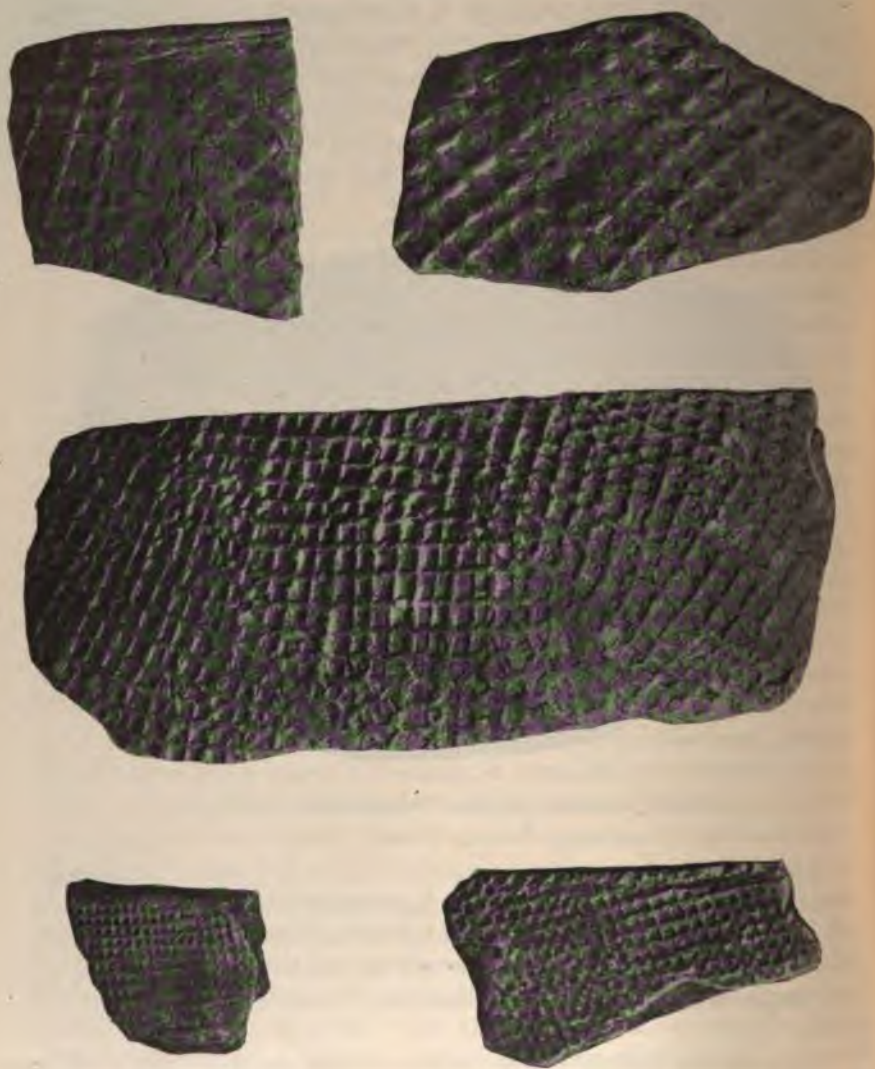


Fig. 7 (20.1-220, 219). Varieties of Stamp-Decorated Pottery from the Oak Hill Shellmound.



mounds "the impressions of basketry, wickerwork, mat-work, and wattle-work." This led to some correspondence, and also to a re-examination of both the collected specimens and the literature, with the result that I found Wyman<sup>1</sup> to state that he discovered three fragments of pottery — in as many different places on the St. Johns River — which had been moulded inside of baskets. Holmes also quotes authorities<sup>2</sup> for the use of basketry moulds in the United States, but cites no instance of it from Florida and expressly concludes<sup>3</sup> that the practice in that region has been greatly overestimated, the checker-stamp pattern often having been mistaken for basketry impressions. He does not deny its occurrence, but says it is the exception rather than the rule; and with this opinion I am inclined to agree. At any rate, the material — a hundred samples or more — collected by myself at Oak Hill and other neighboring sites shows only rectilinear stamp impressions.

*Geographical Distribution of Checker-Stamped Pottery.* We have now considered in a descriptive way all the essential facts brought to light in our shellmound. By checking up with the available literature it has turned out that nearly every important point in our discovery has been, if not always demonstrated, nevertheless more or less clearly apparent to several prior investigators. The single new fact seemingly brought out here for the first time concerns the isolated occurrence along a considerable stretch of the Indian River of the checker-stamped type of decorated pottery.

This checker-stamped pottery, according to Wyman,<sup>4</sup> has also universal distribution over the greater part of the St. Johns River area, directly to the west; but associated with it here and there is pottery decorated with a curvilinear stamp, with cord markings and with incisions. These new types have, however, only independently limited ranges of distribution within the particular area concerned, their various centers of dispersal lying presumably elsewhere. Thus the type decorated with the more or less complex curvilinear stamp, according to Holmes,<sup>5</sup> is clearly indigenous to Georgia and parts of the immediately adjoining states and forms the basis for his so-called South Appalachian ceramic province. Moore, who has a much wider acquaintance with the ceramic phenomena of the St. Johns region, seemingly agrees<sup>6</sup> with Wyman regarding the general distribution of the checker ware; but at the same time he lays much more stress on the time range, if not on the spatial range, of the other types of decoration, including

<sup>1</sup> Wyman, (b), 54.

<sup>2</sup> Holmes, (b), 36, 58.

<sup>3</sup> Holmes, (b), 69, 134.

<sup>4</sup> Wyman, (a), 451-452; (b), 54-55.

<sup>5</sup> (b), 130.

<sup>6</sup> Moore, (a), 1893, 709.



even painted ware,<sup>1</sup> which however, occurs in only one mound and is regarded as of relatively late date. Farther west, on the Ocklawaha River, Moore also found the checker-stamp ware to be quite common,<sup>2</sup> but its occurrence was evidently overbalanced by the other types, painted ware being here quite prominent.<sup>3</sup> In addition he mentions the occurrence of raised or modeled embellishments<sup>4</sup> as well as a punctate type of decoration.<sup>5</sup> If we turn to Holmes, who has published several studies of the pottery in the eastern and southeastern United States, we find him to state<sup>6</sup> that the simple stamped ware of the St. Johns area is common throughout the Florida peninsula and that it extends west into Alabama and north to North Carolina and Tennessee. We might extend the range by adding that Moore<sup>7</sup> has since found examples of the same type of pottery as far west as Louisiana and that Smith<sup>8</sup> observed it even in northeastern Kentucky, near the Ohio River. In the same paragraph Holmes adds the significant statement that "it is not likely that it [the checker-stamped pottery] was characteristic of any particular people or culture group," an opinion with which the data embodied in the present paper seemingly warrant us in taking issue. In other words, according to the evidence now available, it seems that of the various decorated types of pottery found in the southeastern United States such as simple checker-stamped, complex or curvilinear stamped, cord-marked, pinched, punched, stippled, incised, engraved, modeled, and painted, the first-mentioned has possibly the widest geographical distribution. Moreover, its center of origin would seem to be located in east-central Florida because here it occurs in isolation; while, as we move out from this center to the west and the northwest we find it to be slowly thinning out quantitatively, being gradually replaced in different localities by one or more of the great variety of decorative types above mentioned. The remarkable exception to this rule is a small area in North Carolina where a few surviving Cherokee still practise — or did until recently — this same simple type of pottery decoration.<sup>9</sup>

Having pointed out the probable center of origin for the checker-stamped pottery and also its geographic distribution, let us turn, finally, to the question of its historical range. Wyman,<sup>10</sup> it seems, was of the opinion that the

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<sup>1</sup> Moore, (a), 1893, 709, 723; but see also (b), X, 102.

<sup>2</sup> Moore, (b), X, 535, 539, 540, and Plate 86, Fig. 2.

<sup>3</sup> Moore, (b), X, 520, 521, 522, 530, 536, 543.

<sup>4</sup> Moore, (b), 530, 542.

<sup>5</sup> Moore, (b), X, 541.

<sup>6</sup> Moore, (b), 122.

<sup>7</sup> Moore, (b), XVI, 11.

<sup>8</sup> Smith, Plate 25.

<sup>9</sup> Holmes, (b), 56, 134.

<sup>10</sup> (b), 53.

traced or incised ware of the St. Johns region being cruder, was older than the simple stamped ware. Holmes, working presumably for the most part with second hand data and therefore at a disadvantage, appears to take the same view.<sup>1</sup> But, at the same time, in referring to the relatively simple decorative ideas most common in the St. Johns region as a whole, he seems to accept the current supposition that they were characteristic chiefly of the *middle period* of mound accumulation, "the early stage being without pottery and the later having several varieties of ware" of a more elaborate and highly differentiated character.<sup>2</sup> The actual time order of the checker-stamped pottery along the St. Johns is therefore at best a matter of doubt and it is not worth while risking any offhand opinion on the subject. However, at our tentative center of origin for the checker-stamped pottery, along the Indian River, the situation is perfectly clear. Here the ware in question lies stratigraphically directly on top of the crude unornamented ware which latter in fact develops side by side with it to the end of the local shellmound occupation. Along the St. Johns River, a few miles to the west — whatever be the stratigraphic conditions — we have the same ceramic types, viz., plain and checker-stamped as on the Indian River, with the addition of several new types such as incised and painted wares. The question before us is: are these new types of earlier or later date than the type isolated on the Indian River? One can hardly afford a dogmatic answer, but the impression certainly is that they are later. For one thing, as already stated, the checker-stamped pottery has extremely wide distribution, which of itself argues for its relatively great antiquity. Again, while it is conceivable that the great variety of decorative ideas mentioned above may have originated in as many different places in the west and northwest, it is difficult to believe that in an area no larger than Florida the contemporary ceramic products should not be associated throughout. In other words, the presumption is that since no painted or incised or curvilinearly stamped ceramics are found mixed with the checker-stamped ware of the Indian River country, they were not in existence. The fact that they do occur in association on the St. Johns River would then signify, among other things, that the Florida shellmound people at that date had left the Indian River. But the whole subject of Florida's aboriginal history must be worked out in the field. I have merely sought to indicate that there is such a history and that, as Walker wrote,<sup>3</sup> nearly forty years ago, "the key to the whole matter is a critical study of ancient pottery."

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<sup>1</sup> (b), 121.

<sup>2</sup> (b), 120-121.

<sup>3</sup> Walker, 1881, 680.

## SUMMARY AND CONCLUSIONS.

We have outlined briefly the main facts bearing on the situation, size and mode of growth of a large Florida shellmound, by this time already passed out of existence; and have considered at somewhat greater length the nature of its contents. The Oak Hill mound is only one of many similar deposits near and far, and it appears to agree with the neighboring sites in all important respects save one or two. Thus, the apparent absence of pottery in the extreme bottom layer, together with the presence of plain ware in the middle horizons and, finally, checker-stamp decorated ware in the upper level, is a corroboration of prior determinations by Wyman and Moore in similar mounds throughout the adjacent St. Johns River district. The one outstanding new fact of importance brought out in this brief study is the stratigraphic and geographic isolation of the simple checker-pattern type of decoration. The probabilities are therefore that this type of pottery first came into use here and that in view of the extensive distribution it is one of the very oldest ceramic traits to be found in the southeastern states. There remains to state in conclusion, that the tremendous diversification of ceramic traits evident in this general region of North America, both as regards form and decoration, furnishes an ideal basis for a splendid piece of research.

## ADDENDA CONCERNING THE VERO DISCOVERY.

Without wishing here to enter upon a discussion of any one of the various phases of the difficult problem presented by the anthropological discoveries at Vero, I shall record merely a few of my own personal observations, made on May second and third, 1917.

On the day of my arrival, Mr. Isaac M. Weills, the resident gentleman who has done a good deal of the collecting, had just begun to search for some material for Dr. Hay. Naturally, therefore, I remained, not as long as I could have wished, but for a day and a half or long enough to form some opinion on the merits of the site. Mr. Weills and I inspected and tested both canal banks at various places between the railway bridge and the spillway, settling down to work, finally, on the north bank near his "500 foot" mark, i. e., just below the entrance of the small north gully, where specimens of all kinds seemed exceptionally frequent.

The general nature of the formations observed has been described a number of times by competent geologists and others and need not be rehearsed.<sup>1</sup> The special features of the particular section worked by us were seemingly fairly representative; but if not, the variation lay on the side of simplicity. Briefly stated, the conditions were as follows: About five feet below the general level of the surrounding country there ran a seemingly extensive deposit of "marine shell marl" of undetermined thickness, designated by Dr. Sellards as stratum No. 1. With this we have nothing to do so far as the stratigraphic position of archaeological data is concerned. Resting on No. 1 were two additional successive deposits each about two and one half feet thick and known respectively as stratum No. 2 and stratum No. 3, counting from the bottom up. Stratum No. 3, the top layer, was a disorganized mass of dead roots, leaves, pieces of wood, bark, etc., enclosed in a rather attenuated matrix of whitish sand — wind-blown sand it seemed to be. It is a deposit which is still in process of formation and which at this point is simpler and more homogeneous than it is on the south side of the canal where an irregular bed of marl-like substance is introduced some four inches below the surface mulch. Stratum No. 2 was composed of a rather homogeneous fine sand, colored blackish at the top (due presumably to moisture seeping through from the peat-like formation above) but ranging through brownish and slightly stained to pure white in the lower third of the deposit. The upper three or four inches of this sand was slightly cemented and the hardened surface was rather uneven.

The only irregularity in the section to which it seems worth while to call attention was the distinct occurrence in the discolored part of stratum No. 2 of more or less vertically winding passages — perhaps root holes, one to five inches in diameter — which had been filled with whitish sand presumably sifted down from the stratum above. In one place also the underlying marl formation ran out, but possibly it had been removed by the creek.

We worked our section altogether for the better part of one day and found our specimens, both paleontological and archaeological, rather numerous. Most of our material came from the sand layer, i. e., stratum No. 2, and all the archaeological specimens — five of them — taken out in my presence, were found lying directly on the hardened surface of this formation. They consisted of one complete and three incomplete bone awls together with a bit of flint — all comparable to the specimens figured by Professor MacCurdy.<sup>2</sup>

Unfortunately, potsherds were not met with; but Mr. Weills kindly

<sup>1</sup> See e. g., Sellards in *Science*, vol. 44. 615-617.

<sup>2</sup> *American Anthropologist*, N. S. vol. 19, 1917, 255, 257.

gave me a few samples and he has since sent me others, both from the section and from the surface of a neighboring "grove," in addition to two fragments from a shellmound in the vicinity. Interestingly enough, the shellmound samples are of the plain and checker-stamped sort comparable in every way to the predominating wares found at the Oak Hill shellmound. The sherds given me as coming from the Vero section and from the neighboring grove are very nearly identical and differ from the shellmound pottery in having a decidedly gritty instead of a "chalky" paste. The gritty type of ware does occur, however, in the mounds of Florida as Holmes and others have stated. This gritty ware found at Vero is perhaps on the whole of a coarser nature than the other, and, so far as my information goes it is not ornamented. Without going into the subject at length, therefore, it would seem not impossible from a cultural standpoint that the Vero section belongs to the middle period of shellmound occupation along the Florida East Coast.

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**ARCHAEOLOGY OF THE POLAR ESKIMO**

**BY**

**CLARK WISSLER**



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## PREFACE.

The objects upon which this study is based are from the archaeological collections made by members of the Crocker Land Expedition of the American Museum of Natural History, 1913-1918. The sites represented are in the main on the shores of Northeast Greenland, which in historic times were occupied by a group of Eskimo known in America as Smith Sound Eskimo and in Denmark as the Polar Eskimo. The writer was not a member of the expedition, but represents the anthropological staff of this Museum, in whose custody the collections were placed. He is not, therefore, familiar with the characteristics of the sites from which these objects come and can treat them only as objective examples of Eskimo culture. As such, they offer some suggestive contributions to Eskimo anthropology.

The members of the expedition, particularly Doctor Edmund Otis Hovey, geologist of the Museum, Mr. Donald B. MacMillan, the leader of the Expedition, and Captain George Comer, well known to students of the Eskimo for his former contributions, all gave the greatest assistance in the preparation of these pages. The pen drawings were made by William Baake and the plans and map by S. Ichikawa.

CLARK WISSLER.

June, 1918.



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## INTRODUCTION.

The objects described in this paper are from the archaeological collection of the Crocker Land Expedition. The value of observations based upon old Eskimo graves and camp sites is now clearly realized and it may be taken for granted that future explorations in the Arctic will give special attention to the collection of such data. Scandinavian scholars have made considerable progress in this direction, particularly for East and South Greenland. In this country, the first specific contribution was Captain Comer's collection from Southampton Island, Hudson Bay, fully discussed by Boas. Some years earlier, collections from Siberian sites were brought to this Museum by Bogoras, a member of the Jesup North Pacific Expedition, but these were not fully described. Still later, the Stefánsson-Anderson Expedition returned very large collections from sites all the way from Point Hope, Alaska, to Coronation Gulf on the east. These, with the collections returned by the Crocker Land Expedition, present an Arctic archaeological series not paralleled anywhere. Since this Museum also has collections from living Eskimo representing every important cultural group from Siberia to Greenland, it offers exceptional facilities for comparative studies.

While no archaeologist accompanied the Crocker Land Expedition, its members were fully aware of the importance of such data and kept a sharp lookout for old house sites and camp refuse. Captain George Comer, noted for his contributions from Hudson Bay, accompanied the relief vessel in the summer of 1915. Those familiar with the full history of the expedition know that this vessel was frozen in at Parker Snow Bay. Captain Comer was, therefore, an involuntary member of the party until the return of all in September, 1917. Not expecting to winter with the party, he was neither equipped nor otherwise prepared for archaeological work, but, wishing to make the most of the opportunity, he did what he could.

His method was to locate old house sites and dig away the debris covering the original floors. In all, fifty-three such sites were plotted and excavated. Their distribution ranged from Parker Snow Bay to Rensselaer Harbor. In addition, some twenty graves were examined.

Anyone with a general idea of Eskimo life will understand how unlikely it is that a single site will be occupied continuously or even for appreciable periods at intervals. Such conditions are decidedly unfavorable to archaeological investigations, since their successful outcome depends upon the establishment of chronologies as interpretations of observed stratifications,

or superpositions. Nevertheless, Captain Comer found little difficulty in distinguishing between sites belonging to Eskimo of the last fifty years and those of earlier date. His collections, taken objectively, show that some reasonably old sites are represented.

Yet, the most important discovery was a considerable deposit of camp refuse at a site near North Star Bay, a small harbor within Wostenholme Sound. Since the mere location of such a site is unique in Eskimo archaeology, we shall speak of it as Comer's Midden.

## CHARACTERISTICS OF THE LOCALITY.

As to the location and physical characteristics of the site, the following statement is made by Doctor Edmund Otis Hovey:—

The archaeological site dug into by Captain George Comer near North Star Bay was in front of the igloos forming the Eskimo settlement of Oo-ma-nahq, which is actually on the southern shore of Wostenholme Sound. It is on the north side of the isthmus leading out to the butte called Oo-ma-nahq, which rises about seven hundred feet above the sea at the north side of the mouth of North Star Bay. The neck of land lying thus between North Star Bay and Wostenholme Sound presents a gently rolling surface which has been a sea bottom within recent geological time. It consists of a sill of ancient basic igneous rock (diabase) covered with a thin mantle of sand, gravel, shingle, and boulders. The highest portions of the plain, which is from a quarter of a mile to a mile in width, are about fifty feet above the sea. The igloos stand near the sea and are about fifteen feet above high water mark. They command an excellent outlook northward across the Sound and a broader view can be secured from the low cliffs rising about twenty-five feet above the water fifty or sixty yards to the northeast. The low, gentle ridge which ends in these cliffs gives the igloos a measure of protection against the heavy wind that occasionally sweeps out of the fjord. The Eskimo have occupied with igloos at least three sites along the south coast of Wostenholme Sound, but that at Oo-ma-nahq shows evidence of being the principal one utilized. In fact, there are many ruins of old igloos scattered along a zone bordering the sea at this locality, but the natives seem never to have dwelt along or near the shore of North Star Bay itself. The ice remains from two to three weeks longer in North Star Bay than it does in the more open Wostenholme Sound, while seals, walrus, and narwhal are more abundant in the Sound than in the Bay and can be hunted more easily and successfully from Oo-ma-nahq than from North Star Bay.

The refuse heap at which Captain Comer worked, lay in front of three igloos resting in the lee of the low columnar basalt or diabase sea cliffs to which I have referred, their entrances being from ten to twenty feet back from the shore line. The heap was formed by throwing debris from the dwellings over the bank toward the sea. In cross-section it was inclined lenticular in shape, its base being the steeply sloping beach, and, toward the eastern end of the deposit, the ledge of rock which rises one to three feet above it. The lay of the ground caused most of the material thrown on to it to slide or roll down to the bottom of the slope, where much of it could be washed away by the sea or carried off with the ice foot. The vertically sloping west part of the heap, therefore, would not contain the oldest material, but the oldest articles would be those which stuck to the inclined bank and the successive layers, or were held in place there by snow or freezing water until they were covered. The bottom of the deposit, that is its lowest portion vertically, seemed to me to be a mixture in respect to probable antiquity. There did not seem to be anything in the nature of the deposit itself that indicated its age in years. Its rate of accumulation would depend on the number of families occupying the nearby igloos, the continuity with which the dwellings were used and more or less upon the abundance of food and

other material. In times of plenty more would be lost or thrown away than in times of scarcity. The deposit consisted of artifacts mixed with bones, whalebone, ivory, decayed grass, earth, and stones. It exhaled a strong odor of ammonia when the thawed portions were disturbed.

#### EXCAVATIONS IN COMER'S MIDDEN.

Fig. 2 shows the site of Captain Comer's excavations. According to his notes, a considerable space at the foot of the ledge was filled with fallen rock and sand. This mass of debris presents a triangular cross-section with a base of about ten feet. Built up on its irregular surface was a layer of camp refuse to the average depth of about five feet. A section of this was dug away as shown in the illustration.

Captain Comer assumed that since the outer surface of the midden was subject to repeated thawings and freezings, it would be wiser to discard, or segregate this layer. Consequently, about two feet was removed, exposing the solidly frozen mass beneath. It is apparent that the refuse of each year raised the level of the heap and thus brought one notch higher the perpetually frozen deposit beneath. Excavations in this frozen layer were tedious. It was necessary to wait until the surface had thawed for an inch or two, then scrape the muck away and wait again.

All of the objects described as from this midden were taken from the frozen layers where they had been in perpetual cold storage ever since they reached the ice table. On this account, we cannot judge their ages by degrees of decay.

#### THE AGE OF THE DEPOSIT.

While the place of these remains in Eskimo culture is a point to be demonstrated in the succeeding discussions, certain general observations may be noted at this time. In the first place, stone tools of every kind were absent. Only three slate knives were found, a few flakes of flint, a bit of chalcedony and two stones showing chipping (Fig. 13). It may be objected that these are, nevertheless, sufficient evidence for the use of stone, but our experience with other sites around Hudson Bay and westward is that the camp debris left by a stone-using Eskimo, will yield many examples of such use. Further, if the many hafts of tools found had indicated stone points and blades, the failure to find stone here might be ignored as a puzzling inconsistency, but as we shall see, these hafts indicated the use of metal. In fact, some tiny fragments of iron were secured.



Fig. 1. The Village of Oomanahq, Comer's Midden to the Left. Photo by Dr. E. O. Hovey.



Fig. 2. Near View of Comer's Midden showing Excavations. Photo by Dr. E. O. Hovey.





The other materials shown in the collection are bone, antler, wood, and whalebone. Of ivory, there are a few examples, all of which show little weathering and according to Captain Comer's statements were on, or near, the surface. The distribution of the other materials was approximately uniform, except that the objects of whalebone were near the bottom.

Large quantities of unworked bone were removed, in fact such material made up a large part of the refuse heap. In the main, there were the bones of rabbits, birds, caribou, and seals. Seal teeth were also numerous. Those of the bear were seldom met with and the walrus scarcely at all; indeed, but a single tooth for the latter. Ivory, as stated, was scarcely in evidence. On the other hand, the true whalebone was surprisingly abundant, though body bones were not equally well represented.

Another striking feature was the great mass of spruce wood fragments, suggesting that wood played a prominent part in the culture of these Eskimo.

As the description of the site suggests, the precise determination of the order of accumulation is not easy. Objects thrown over the bank would tend to reach the bottom of the sloping refuse heap, so that we may suspect the horizontal order at the base to be the most significant. However, Captain Comer's method avoided many of the complications presented, for he first took off two to three feet of the outer surface and segregated the objects found. The remainder of the deposit was frozen and necessitated removing but a thin layer day by day as the freshly exposed surface thawed out. Thus, there is no reason to doubt that the collection from this lower section of the refuse belongs to a period earlier than that from the surface layer. No glass or other traces of trade articles were found in this lower layer, though such may be seen on the surface at camp sites around the bay. At Etah several of the house sites excavated yielded bits of glass and some a few brass shells of the type used in Kane's time, while many gave no sign of European contact. Further data upon these points will be developed as we proceed with the detailed account of the objects found.

#### METHODS OF WORKING BONE AND IVORY.

Although repeated references are made to the technique of bone and ivory working among the Eskimo in the many publications upon the culture of these people, no full description of the processes involved has come to notice. It is generally stated that these materials are worked by cutting, sawing, and drilling, and that of these, the most preferred and perhaps the most aboriginal, is drilling. A discussion of these processes, as illustrated in the archaeological collections returned by the Expedition, seems advisable,



since they may give us some basis for estimating the relative age of the Eskimo cultures represented.

Of the three processes named, sawing is undoubtedly recent, since it can only be executed in the manner observed in the collections by the use of a metal saw. Some of the objects from each of the localities represented give evidence of having been worked by sawing. In some cases, the trial saw cuts of the native workman are still to be seen. These are of such a form and size as to preclude the possibility of the use of any other implement save a modern steel saw. Even specimens from Comer's Midden present a few examples of sawing, though most of the antler objects in that collection have been worked by cutting or hacking. (But one piece in the entire lot shows evidence of having been grooved on opposite sides and then broken.) On the other hand, the collections from other points in North Star Bay, from Parker Snow Bay, Saunders Island, and the vicinity of Etah, furnish many examples of sawing, particularly in the edges of bone sections for sled runners and on the edges of ivory sled shoes. Anyone familiar with Eskimo collections will recall frequent examples of saws, in many cases, of native manufacture. The usual form is a small blade of trade steel, the teeth for which have been produced by filing, hafted with a curved piece of antler somewhat like the handle for the ordinary carpenter's saw. As will be shown elsewhere, no metal tools of any kind were found in Comer's Midden, but from the other sites a number of such implements was collected, among which is a saw of this type from Etah. It is further plain that all of the collections obtained, with the possible exception of those from the deeper layers in Comer's Midden, belong to a period when trade saws and their counterparts were in general use among the Eskimo of Greenland.

As stated before, the preferred Eskimo method for cutting bone, antler, or ivory, is by drilling holes side by side in the direction of the desired cut and then breaking off the material along this line. While this method has been cited as almost peculiar to the working of ivory, our collections show that it is also applied to working antler and bone of the whale, though it is true that the number of examples of such drilling is far greater in ivory than in the other materials, particularly in the collections from the vicinity of Etah. On the other hand, it will be noted that ivory objects were of rare occurrence in Comer's Midden and such examples as were noted seem to have been on the surface. Nevertheless, among these is a piece of ivory cut by drilling with a very small drill, something less than one-sixteenth of an inch. The holes are deep and clear-cut, such as scarcely could have been accomplished without a metal drill. But there is also a piece of antler from this same deposit cut in the same way. The collections from Etah contain a very fine example of the application of this method to the cutting of antler

in which we find a large tine has been cut off by drilling twenty-four holes in a line passing entirely around the piece. The drill in this case was about three-sixteenths of an inch. There are other examples in the collection of antler cut in the same manner. Yet, if we take into consideration the entire number of worked pieces of antler returned by the collectors, it must be said that the usual method is by sawing, except in Comer's Midden, where almost without exception the antler has been cut or hacked.

The Etah collections contain a large series of whale bone slabs used in making sleds. Most of these, as previously stated, have been brought to their present shape by sawing, but a few show evidence of having been cut by drilling. Similar pieces were not returned from the other localities, except one from North Star Bay which, incidentally, was cut by drilling. From Comer's Midden there are no examples of such whale bone sled pieces, though there are pieces of worked bone evidently used in the construction of sleds. The inference would be that the type of sled used by the people occupying the site of Comer's Midden was different from that returned by these collections. To this point we shall refer again.

From Comer's Midden there is an interesting oval flat piece of bone, a section of which has been cut out by drilling. A similar piece was found nearby on the shore. A piece of ivory sled shoe from Etah shows an interesting example of drilling in some secondary working. It had been brought to a point by drilling and then wedged so as to break away the corners.

From Etah and Saunders Island come many sections of ivory sled shoes, all showing evidence of having been worked by splitting and sawing. Their form, size, and arrangement of the drill holes show them to be of one precise type. The interesting point is that no such sled shoes were found at Comer's Midden. There were, however, long pieces of bone drilled in a different manner which may have served the same purpose.

Another object of frequent occurrence in Comer's Midden is a bone snow knife of the well-known Greenland type. The curved handle for this has been cut out by hacking. In no case is there evidence of sawing or drilling.

The apparent rarity of drilling at Comer's Midden, in contrast to what seems to have been the rule in the other sites, makes a brief examination of drills desirable. Five metal drills in wooden shafts were collected: one from Saunders Island; one from the shore of North Star Bay; one from Parker Snow Bay; and two from Etah. One or two special points in these deserve mention. In one specimen (60.1-4575) the tang of the drill, which is driven into the wooden haft, has been given a triangular form, doubtless to prevent its twisting in the shaft. Fig. 3 seems to have been a double tool. When found, the metal drill point was in place, as shown in the drawing, but on

examination, it appears that it was held in place laterally by two small wooden wedges. When these were pulled out the shaft was easily withdrawn and the other end of the point found to have been beaten out in the form of a small chisel or other cutting tool. From general appearances, this metal point seems to have been beaten out from a nail. No similar tool has come to notice and this may no doubt be set down as another example of Eskimo ingenuity. The points of all the drills have the same form, as shown in Fig. 3. They are slightly flattened with somewhat flaring edges. That this form is rather universal in Eskimo drills is indicated by its occurrence in specimens from Alaska.<sup>1</sup> Murdoch describes a specimen with a bone point of this same shape suggesting that the type is an old one even antedating the use of metal. Naturally, the stone drill points that have been so far collected do not have this form, but taper slightly from the point. Nevertheless, they do show a rounded end similar to the iron specimens in our collections.

As previously stated, no metal drills were found in Comer's Midden; and though there are a considerable number of wooden objects, among these appear no drill shafts. Still, we do find a piece of bone (Fig. 4) which bears a striking resemblance to both the metal drill point and to the bone point described by Murdoch. It is not certain that this is a drill point but the similarity is so striking that attention is called to it. With this exception, there are no specimens from the Midden that suggest drills, though, of course, there are evidences of drilling in some of the objects.

In conclusion, it appears that while there may be some differences between the culture of the people occupying the site of Comer's Midden and those occupying the other localities from which collections were returned, all belong to a period when metal tools were in general use. Particularly, the size, depth, and form of drill holes found in the worked material at most of the sites leaves no other conclusion but that metal drills were used.

#### KNIVES.

Perhaps the most interesting objects in the collections from Comer's Midden are some fragmentary knife hafts similar to some specimens described by Boas from Southampton Island. The best example of this type was fully described by this author whose illustration we reproduce here;<sup>2</sup>

<sup>1</sup> Murdoch, John. "Ethnological Results of the Point Barrow Expedition" (*Ninth Annual Report, Bureau of American Ethnology*, Washington, 1892), 179.

<sup>2</sup> Boas, Franz, "Second Report on the Eskimo of Baffin Land and Hudson Bay" (*Bulletin, American Museum of Natural History*, vol. 15, part 2, 1907), 384, Fig. 178.



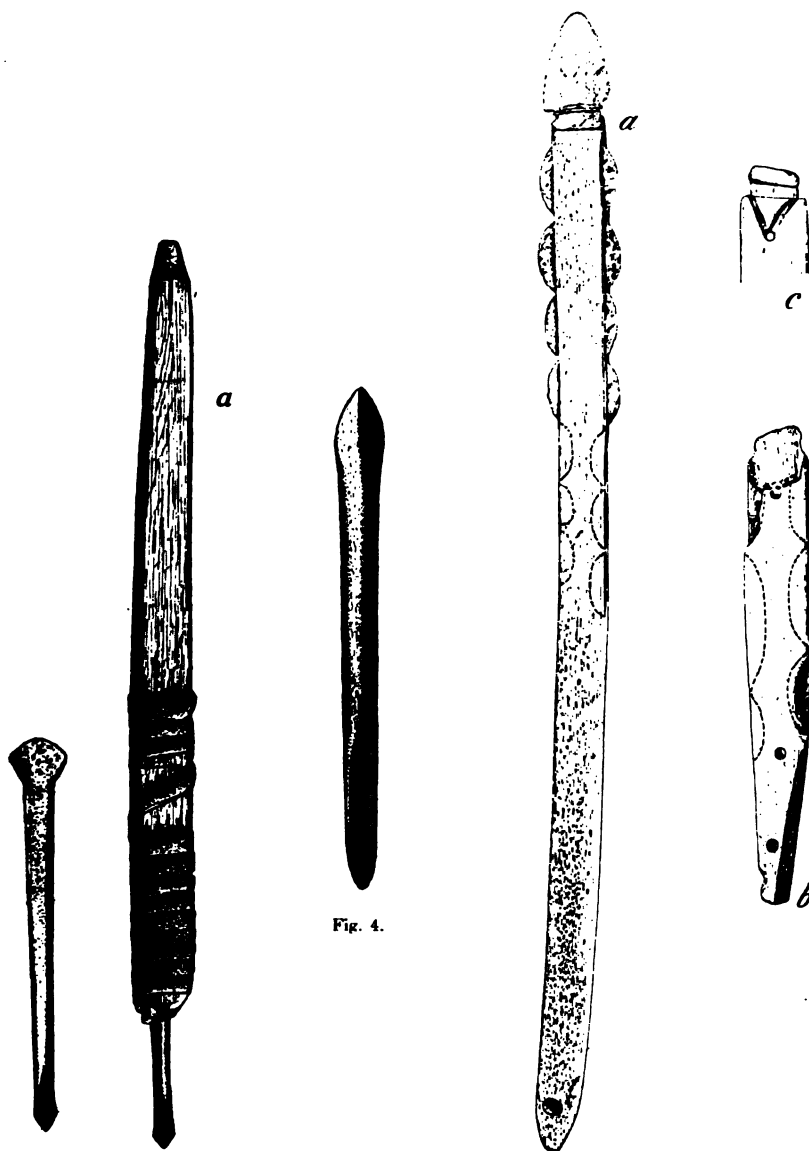


Fig. 3.

Fig. 5.

Fig. 3 (60.1-4540). Drill with a Detachable Point, Parker Snow Bay. Length of *a*, 23.5 cm.

Fig. 4. (60.1-4480). A Bone Point resembling a Drill, Comer's Midden. Length, 7 cm.

Fig. 5 (60-5144, 5389). Bone Knives with Stone Blades, Southampton Island. Length of *a*, 68 cm. Boas, 1907.

(Fig. 5). It will be noted that the cutting edge of this knife is formed by blades of chipped stone inserted in pockets along the edge of the bone haft. A fragment of such a haft, in every way similar to the figured specimen from Southampton Island, is shown in Fig. 6a. It had, as may be seen, a point at the end, while on each side of the part remaining we find three deep pockets for the insertion of blades. The difference between this specimen and the one from Southampton Island lies chiefly in the width of these pockets. This width is uniform from end to end and is approximately 2 mm. In fact, it is made with such precision that one must assume that the blades to be inserted were exceedingly regular. This regularity and the narrowness of the slot makes it difficult to conceive that stone was used as the knife edge. It seems much more likely that metal blades of a leaf-like shape were inserted in these pockets.

Fig. 6c is part of a knife haft both ends of which are missing and which seems to have had a row of similar blades on one side, three pockets for which remain. These have the same regular form as the preceding, but are something less than 2 mm. in width. Fig. 6b differs from the preceding, for while it is cut to receive both end and side blades the grooving does not take the pocket form, but is continuous as if a long metal blade had been inserted. It will also be noted that the point was held by a rivet. The two holes at the opposite end may have been to repair a break. The long continuous groove, or slot, in this handle is also between one and two millimeters in width. It is true that the bottom of the groove contains slight pocket-like depressions, but there are no partitions to separate these, so that it may be assumed that the workman intended to cut the slot an even depth.

Figs. 6d and 6c represent small fragments of knife hafts with grooves on one edge only. These grooves are similar to Fig. 6b in that they are continuous and without pockets.

There are a number of other specimens in Comer's Midden collection containing grooves similar to those figured.

In general, it appears, therefore, that while we have here undoubted examples of knives formed after the same pattern as those described from Southampton Island, the character of the grooves is such that iron or other metal blades must be assumed. As stated elsewhere, practically no chipped stone was found in Comer's Midden. Also, strange to say, but two definite traces of iron were found.

Captain Comer notes in his diary, under date of August 29th, 1916, that he found part of a knife blade two feet below the surface containing flakes of iron set in a groove so as to form a cutting edge. He made, at the time, a rough sketch of this specimen, which is reproduced here (Fig. 7). Unfor-

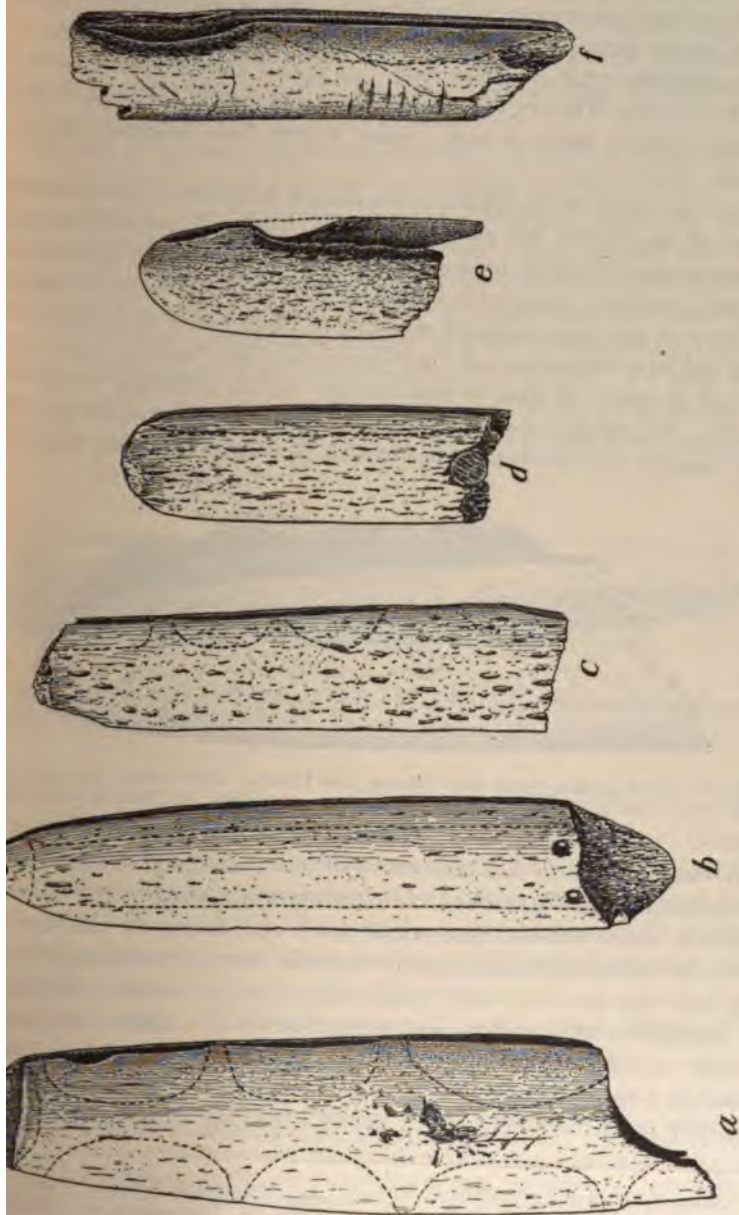


Fig. 6 (60.1-4409a, 4409b, 4409c, 4409d, 4409e, 4614). Bone Hafts for Knife Blades. Length of a, 16 cm.

tunately, this specimen, with others, was lost in transit. Nevertheless, it must be taken as conclusive evidence that the people occupying this site did use knives formed by setting small flakes or leaf-like pieces of iron in a groove along the edge of a bone haft. As is well known, such knives have been noted from Western Greenland, the cutting edge to which consisted of small leaf-like flakes of iron. Some writers have assumed this to be meteoric iron.<sup>1</sup>

The haft shown in Fig. 6b has a few minute flakes of oxidized iron at the bottom of the groove, but since this knife is evidently grooved for a long continuous blade it seems unlikely that this could have been meteoric iron. It seems, therefore, reasonably certain that though the people of this site may have at one time possessed meteoric or other native iron, they nevertheless did have access through trade channels to iron tools or, at least, to a sufficient quantity of iron to manufacture knives according to their old pattern. The missing specimen referred to in Captain Comer's diary certainly suggests the descriptions of meteoric iron knives cited by Boas.<sup>2</sup>



Fig. 7. Part of Bone Knife Haft bearing Iron Blades. Drawn from Captain Comer's sketch.

We were unable to find any traces of iron remaining in the specimens represented in Figs. 6a and 6c, or the ones in which there were well-defined pockets in which leaf-like blades must have been inserted. As previously stated, our reasons for assuming the material used in the pockets of the knife hafts was iron, are their regular shape and narrowness. Fortunately Mr. MacMillan secured from Rensselaer Harbor in August, 1916, what is probably a knife (Fig. 8) made of antler, in one side of which is a pocket containing a chipped blade. The pocket or groove for this blade is shaped differently from the specimens in Comer's Midden. Instead of having a

<sup>1</sup> Boas, *ibid.*, 384-386; Thalbitzer, William, "The Ammassalik Eskimo. Part I. Contributions to the Ethnology of the East Greenland Natives" (*Meddelelser om Grønland*, vol. 39, Copenhagen, 1914), 488-490.

<sup>2</sup> Boas, *ibid.*, 384.

uniform width, it is oval, tapering at each end to conform to the outlines of a chipped flake. It further appears that there was a similar stone blade on the opposite edge, but only a small part of the groove remains. The finder of the specimen turned in a second piece of stone which may have rested in this groove when the haft was intact.<sup>1</sup>

This find is not only interesting because it gives us an opportunity to compare the two types of knife haft in question, but also because it is the first specimen, to our knowledge, found in Greenland suggesting the type of knife described from Southampton Island by Boas and the curious harpoon heads from Alaska and adjacent regions in the sides of which were grooves containing small flaked blades.<sup>2</sup> It would seem therefore that the use of knives with cutting edges formed by a row of flakes was at one time universal among the Eskimo from Greenland to Alaska. We may be warranted, therefore, in concluding that the iron knives formed by setting small flakes of iron in a row along the edge of the bone handle, were copies of the



Fig. 8 (60.1-5096). Knife bearing Lateral Stone Blades. The opposite blade is missing. Rensselaer Harbor, Length, 15 cm.

older stone knife, as has been suggested by Boas, Thalbitzer, and others<sup>3</sup> and also that the pocketed hafts from Comer's Midden belong to this series. It need not necessarily follow that the natives at Comer's Midden used meteoric iron. It may be imagined that natives coming in contact with iron in small quantities and incidentally, would be likely to make knives in the form of those already in use and thus make them conform to the old type of stone knife.

The probability of this is suggested by another find. In June, 1917,

<sup>1</sup> As to the finding of this specimen Mr. MacMillan writes as follows:— It was found in Rensselaer Bay in one of the very numerous old igloos dotting the whole coast line from Etah 78° 20' to the southern edge of the Humboldt Glacier, 79° 10'. This knife was brought to me by an Eskimo by the name of Myah, who found it in August, 1916. Both cutting edges of flint were with the handle. How the knife was used I do not know. I have drawings of other old knives, as described by the older men of the tribe, but all with numerous teeth, some of which overlapped.

<sup>2</sup> Wissler, this series, vol. 14, part 2, Fig. 3bcd, 407.

<sup>3</sup> Boas, *ibid.*, 484; Thalbitzer, *ibid.*, 490.



Captain Comer found in an old house ruin near Etah a number of objects among which was Fig. 6f. This is a rather curious fragment of what seems to have been a knife, for the haft is almost circular in cross-section instead of flat and knife-like, as in the specimens previously described. Yet, on one edge of the fragment are two pockets similar to those described, in one of which there remains a fragment of iron. The groove resembles that of the preceding in its regularity and is again approximately 2 mm. wide. Another curious feature is that the grooves do not run exactly parallel to the fragment and there is also a small pocket cut to one side of the others, suggesting an error in workmanship. The fragment of iron shows indications of crude beating, but its appearance does not suggest meteoric iron. In fact, Professor R. W. Tower of the Museum staff tested it for nickle without result.

Again, at the same place Captain Comer picked up a small piece of antler in the end of which had been driven the section of a knife blade (60.1-4617). Of course, there is no way of knowing whether this specimen is more recent

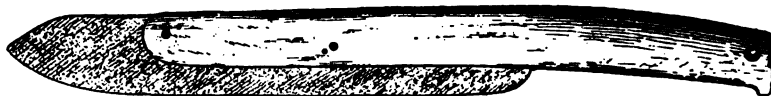


Fig. 9 (60.1-5064). A Knife of Recent Make with Blade of Hoop-Iron. Length, 31 cm.

or even contemporaneous with Fig. 6f. The amount of weathering of the two bones is about the same. It is, however, obvious that the maker of the specimen 60.1-4617, had access to trade knives.

Near Sunrise Point Captain Comer found in a house ruin, among other objects, a fragment somewhat similar to Fig. 6f. The pockets in this specimen are rather deep but are otherwise not different from Fig. 6f. Yet, no traces of metal were observed. In the same ruin a number of stone chips were found, none of which, however, suggest their use in knives of this sort.

At various places in the vicinity of Etah Mr. MacMillan found fragments of knife handles, some grooved on one side and some on both, but in every case the grooves were without pockets, narrow and straight, suggesting the use of long strips of iron or steel knife blades for the cutting edges. In other words, they resemble, in every particular, recent Eskimo knives such as may still be seen in collections (Fig. 9).

At this point it may be worth examining the few examples of chipped stone returned by the collectors to see if any of the objects could have served as blades for knives similar to Fig. 8.

As previously stated, there was very little stone from Comer's Midden. However, there were three flint chips indicating that at least some chipping had been done there. From the vicinity of Etah twelve sites returned some examples of chipping though these were usually confined to one or two chips. Captain Comer found, July 29th, 1917, while digging in a house ruin near Sunrise Point, a small cache of flint chips on the left side of what was the passageway to the house. There are, in all, something over a double handful of these chips, but they are simply flakes struck off evidently in the making of stone implements. There are but three pieces in the lot



Fig. 10 (60.1-4734, 4597, 4650, 4622, 4639). Chipped Flints from Etah. Length of *a*, 2.4 cm.

that show fine surface chipping. Among these are flakes struck off in re-shaping a large tool of some sort. The surface chipping is particularly fine and regular. Of the entire series of fragments from the other sites, not over a large handful in all, we find no piece that seems at all suitable for insertion in a knife, with one possible exception. Fig. 10e was found in a house ruin at Etah and may be a part of a broken lance head, but is also of such a shape that it could be set in the pocket of a bone knife similar to Fig. 8.

The only other cases of chipping deserving mention are shown in Figs. 10 and 13. Fig. 10a is evidently the blade for a small scraper; Fig. 10b

has the appearance of a spoke shave, though this may be accidental; Fig. 10c is a carefully shaped object which we have been unable to identify; and Fig. 10d which is apparently part of a drill.

One peculiarity of the knives from Comer's Midden is the absence of the type from Greenland well illustrated by Thomsen.<sup>1</sup> This type has a long slender bone handle with a groove cut on one side near the end for the insertion of a blade. As has been remarked by writers upon the subject, this type of knife is a prototype of the stone knife formed by placing a small stone blade near the end of a handle, such as may be seen in Alaskan collections illustrated by Murdoch.<sup>2</sup> Knife handles of the type described by Thomsen, referred to above, were found at various sites in the vicinity of Etah. All of them are so grooved as to indicate the use of metal blades. It is, however, not clear why this type of knife is absent in the collections from Comer's Midden; yet, it may be remarked that there is one incomplete handle, much weathered, near the end of which there is a very narrow shallow slot or groove about 2 cm. long and slightly less than 1 mm. in width. The form of this thus suggests that it was originally the handle for some other kind of implement and that this groove was made here in secondary working of some kind. As it has only the vaguest resemblance to the knife referred to above, it cannot be considered as a *bona fide* example.

We do, however, find objects indicating the use of somewhat similar knives. Fig. 11a may be taken as the type. As will be observed, the knife blade was inserted in the end by a tang and the portion of the handle that remained was so grooved as to suggest a wrapping or binding such as may be observed upon the knives in Eskimo collections. There is a deep hole in the end of this handle in the bottom of which we found a small metal fragment surrounded by a curious bluish stain, suggesting copper, but the fragment proved to be iron. It is thus clear that this is the handle of a metal knife and one may assume that it had a large blade somewhat similar to knives from Hudson Bay figured by Boas.<sup>3</sup> Since such a knife could not well be made of native iron, we assume this blade to have been of commercial iron.

Altogether there are seven handles of this type from Comer's Midden. One of these has the remains of a sinew cord in the handle hole. All have deep sockets in the end for tangs similar to that of the figured specimen. The form and depth of these sockets suggest similar metal blades. It is

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<sup>1</sup> Thomsen, Thomas, "Implements and Artefacts of the North-East Greenlanders Finds from Graves and Settlements" (*Danmark-Ekspeditionen til Grønlands, Nordostkyst, 1906-1908, Meddelelser om Grønland*, vol. 44, Copenhagen, 1917), Fig. 26, 429.

<sup>2</sup> *ibid.*, 160, Fig. 117.

<sup>3</sup> Boas, *ibid.*, Fig. 202, 404.

true that we have a knife of frequent occurrence in Greenland collections and also extensively in the Stefánsson collections from Alaska, which carried a short stubby stone blade. A large series of handles from Point Hope and Point Barrow shows forms strikingly like the handles from Comer's Midden, but in most cases these were intended for stone blades, the sockets being much more shallow and of a different shape. We also have from the same Alaskan sites a number of specimens with the stone blades still in place. A comparison of these with the handles from Comer's Midden leaves us no other conclusion than that the latter handles were all fitted with metal blades.

From another site at North Star Bay Captain Comer picked up a handle in every way similar to Fig. 11a. There are curious greenish stains on this specimen and another from the same site, suggesting copper, but no piece of metal remains.

There are two other objects from Comer's Midden which seem to have been intended for knife handles. These are longer than the specimens just described being in fact long enough for two-handled knives such as have been described for the Eskimo further west. One of these handles is shown in Fig. 16a. There is a shallow groove across the end apparently for the insertion of the knife blade. There are, however, no rivet holes, suggesting that this handle was never completed. The other specimen is similar to this except that it bears a rivet hole but is not figured because of its fragmentary condition. A comparison of these with knife handles from Hudson Bay and elsewhere indicates that these are most likely handles for a large two-handed knife. So far as I know, this type has not heretofore been observed in Greenland.

No handles of this type were returned from any other site except a possible specimen from the vicinity of Etah. This is, however, in such a fragmentary condition that it is impossible to determine its precise character and it may therefore be passed as doubtful.

The only other object from Comer's Midden suggesting a knife handle is the fragment shown in Fig. 11c. Somewhat similar forms, as for example, Fig. 11b, were picked up at several sites near Etah. The above is, however, the only example of such a handle from Comer's Midden.

From another site on North Star Bay comes a knife handle, much weathered and decayed. Its form is clearly indicated in Fig. 11d. It has a deep groove in the edge at the end, indicating the insertion of a blade and certain green stains about this aperture suggest copper. The handle end has been grooved as if for attaching a cord.

In general, then, it may be said that practically all the knives from these sites in West Greenland belong to the metal-using period of Eskimo culture.



Fig. 11 (60.1-4404a, 4633, 4404b, 4515). Knife Handles: *a*, Comer's Midden; *b*, Etah; *c*, Comer's Midden; *d*, North Star Bay. Length of *a*, 12.3 cm.

The significance of this has been discussed at length by Thalbitzer<sup>1</sup> and by Solberg<sup>2</sup> and more recently by Thomsen.<sup>3</sup> From these discussions it seems that the only example of the old Eskimo stone knife similar to the type specimen described by Boas from Southampton Island (Fig. 5) is the one shown in our Fig. 8. The Museum at Copenhagen seems to possess several examples of knife hafts similar to our Fig. 6 but none of these indicates the use of a stone blade. We have previously mentioned the possibility of meteoric iron having been employed for the blades of such knives. The investigation of Danish students has shown, however,<sup>4</sup> that most of the early iron knives used by the Eskimo in West Greenland were made from native telluric iron and not meteoric. As to the use of telluric iron we shall have more to add later. It has been assumed therefore, that the Eskimo iron culture of West Greenland is very old and possibly even older than the period of European contact. The assumption is that the pocketed haft of the type shown in Fig. 6 is a literal copy of the older stone knife shown in our Fig. 5. It would follow, therefore, that the old and original type of Eskimo knife for both the Hudson Bay region and West Greenland was one having an edge formed of small chipped pieces of stone set in a row. This gives us a kind of chronology for West Greenland in that the sites showing iron knives of the type of Fig. 6 are almost contemporary with sites on Hudson Bay yielding stone knives of similar pattern. Further, we may assume that the knife formed by a long narrow blade of iron set in a groove is a later type, possibly, as has been suggested, a direct copy from European trade knives. Hence, we may assume that all sites returning knives of this character belong to the historic period. If this assumption is justifiable it appears that at least the lower strata of the site at Comer's Midden belong to the earliest period of Eskimo occupation in West Greenland and are certainly older than many of the sites examined in the vicinity of Etah. Nevertheless, there were certain sites at Etah, particularly the one yielding the specimen shown in Fig. 6f and the one from Rensselaer Harbor, giving us so far the only known example of a stone-edged knife of this type. As to whether there was a still older culture in West Greenland properly designated as a stone age culture, we need not discuss at present. Suffice it to say that no evidences of such a period of occupation were brought to light by the archaeological work of this Expedition.

<sup>1</sup> Thalbitzer, *ibid.*, 488-490.

<sup>2</sup> Solberg, O., "Belträge zur Vorgeschichte der Ost-Eskimo" (*Videnskabs-Selskabets Skrifter*, II, Hist.-Filos. Klasse, Christiania, 1907), 53-54.

<sup>3</sup> Thomsen, *ibid.*, 424-434.

<sup>4</sup> Thomsen, *ibid.*, 432.

## ULU OR WOMAN'S KNIFE.

As previously stated, few stone objects were found in Comer's Midden.<sup>1</sup> Altogether there were just nine pieces, some of which have already been referred to (p. 127). The others are shown in Figs. 12-14. Of these Figs. 12ab are undoubtedly ulus, and of particular interest because they seem to have been used without an additional haft, though from the roughness of the edge it must be inferred that some kind of binding or other hafting was used. The cutting edges have been carefully ground and in the case of Fig. 12a, to a remarkable keenness. Fig. 14 is evidently the blade for a small ulu-like knife, tapering at the top to form a tang for insertion in the handle.

Fig. 13a is a curious fractured form having what seems to be a broad cutting edge. This may be an accidental chipping, but the edge shows some signs of wear from use. Fig. 13b is still more curious. It reminds one of certain paleolithic types, in fact, the *coup de poing*. Its sharp chisel-like edge shows some indication of wear. The top of the object seems to have been broken away. The function of this implement, if implement it is, can, of course only be conjectured.

Among the bone objects were thirteen ulu handles of various forms. The prevailing type is shown in Fig. 15a and a slight variation of the same in Fig. 15b. The interesting thing about all these handles is that they have a very deep but narrow slot suggesting the use of a metal blade. There is, in fact, but one in the whole lot which has a slot of a form suggesting a stone blade. In this case, we cannot be sure, however, for the specimen seems to have warped slightly, which may account for a certain amount of distortion

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<sup>1</sup> Note on the Stone Implements and Chips in the Crocker Land Expedition Collection, by Dr. E. O. Hovey.—The few stone implements and artificial chips recovered from Captain Comer's midden at Oo-ma-nahq near North Star Bay are bits of slate or flakes of trap rock (diabase) from the vicinity, aside from one knife point worked from a chip of chalcedony. Chalcedony was collected by Mr. Elmer Ekblaw, geologist of the Crocker Land Expedition, from cavities in the ancient igneous rocks of McCormick Bay and it is not unknown elsewhere along the coast.

True flint artifacts and flakes were found in the refuse heap excavated by Captain Comer near Littleton Island. These resemble the flint of England so closely that it seems most probable that the material was brought to the north water of Baffin Bay by the whalers who frequented the region in the years following Captain Ross's visit. Magister M. P. Porsild, chief of the scientific station at Godhavn, Island of Disko, has obtained from the Greenlanders of Danish Greenland fragments of flint that were brought to their Eskimo ancestors by English whalers for use in the flintlock guns that were utilized in trading in former days. Such flints are reported to be common in the more recent kitchen middens of that part of the coast.

Flint, or chert, is probably rare along the coast from Cape York to Smith Sound. Neither Mr. Ekblaw nor I saw any there, but the Eskimo told the former that it occurred at McCormick Bay and in the limestone beds of Northumberland Island.



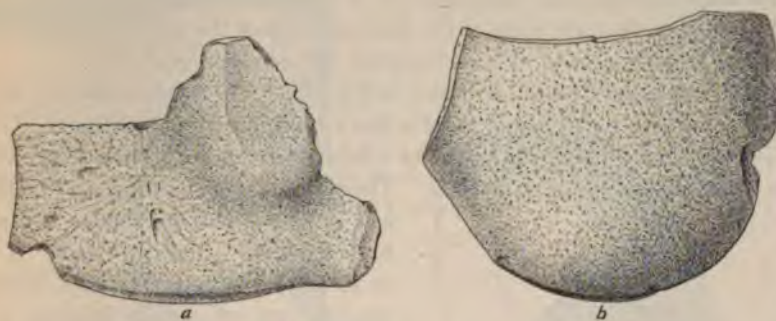


Fig. 12 (60.1-4402a-b). Stone Ulus, made from Local Diabase. Length of *a*, 13 cm.

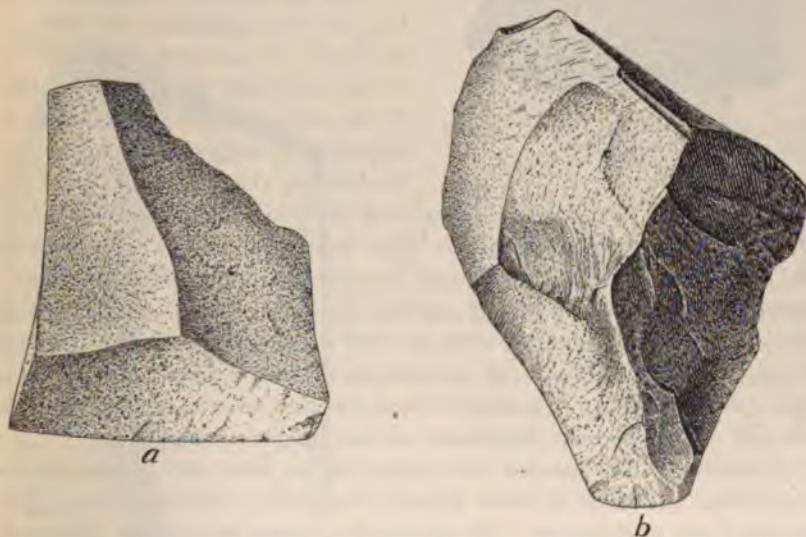


Fig. 13 (60.1-4402d-e). Chipped Stones: *a*, Slate; *b*, Diabase. Length of *a*, 6 cm.



in the shape of the slot. It is not clear, therefore, what may be the relation between these evidences of iron-bladed ulus and the more primitive stone ulus just described. Of course, several explanations suggest themselves. As for instance, the mere accidental use of stone implements in case of need and again that they are some of the last survivals of the period in which all such knives were stone. These, however, are purely speculative.

A curious type of handle is shown in Fig. 16c. The specimen is in a very fragile condition, but it seems to have had a blade inserted in a groove at its lower edge, suggesting a ulu. On the other hand, the purpose of the extension to the handle is not quite clear. There is a suspicion of a groove in the

end of this extension, but as to that we cannot be certain. There is a small wooden object (Fig. 16b) which reminds one of certain modern ulu handles. Though the object here is but a toy, nevertheless it must be taken as positive evidence that the conception of this type of ulu handle was in the mind of the maker.

Finally, we have a singular haft in Fig. 15c the significance of which is not clear. It is a piece of antler, following somewhat the natural contour of the material, but nevertheless so shaped as to suggest its being held in the hand by the thumb and index finger

on one side and the three fingers on the other. The peculiar curved notch in the end shows a high polish from wear, as if the index finger were held there in use. On the other hand, the extended end of the instrument is sharpened almost to a chisel edge and this also shows signs of wear. A large section of the lower edge has been cut with a deep groove for the insertion of a blade. This is about 8 cm. in length and has an average width of 3 mm. This again suggests an iron blade of some sort, but what may have been the function of this peculiar implement we are unable to suggest.

A number of ulu handles were picked up at other sites visited by the Expedition, but none of them present important differences from those described here or elsewhere. We do miss in Comer's Midden the ulu handle made of two pieces, a form described by Boas from Southampton Island<sup>1</sup>



Fig. 14 (60.1-4402c). Part of Ulu Blade, Slate. Length, 6.5 cm.

<sup>1</sup> Boas, *ibid.*, 430, Fig. 231; also Kroeber, A. L., "The Eskimo of Smith Sound" (*Bulletin, American Museum of Natural History*, vol. 12, art. 21, 1900), Fig. 28.

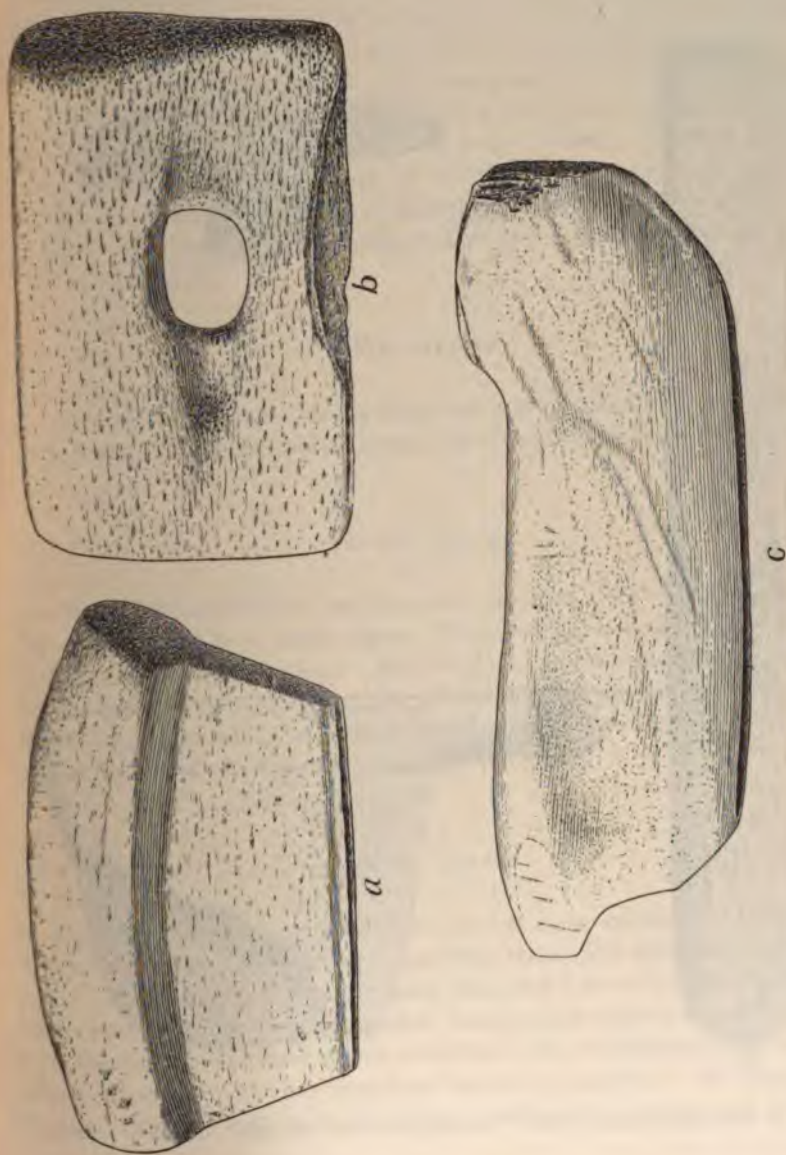


Fig. 15 (60.1-4405a-c). Ulu Handles. Length of a, 9 cm.

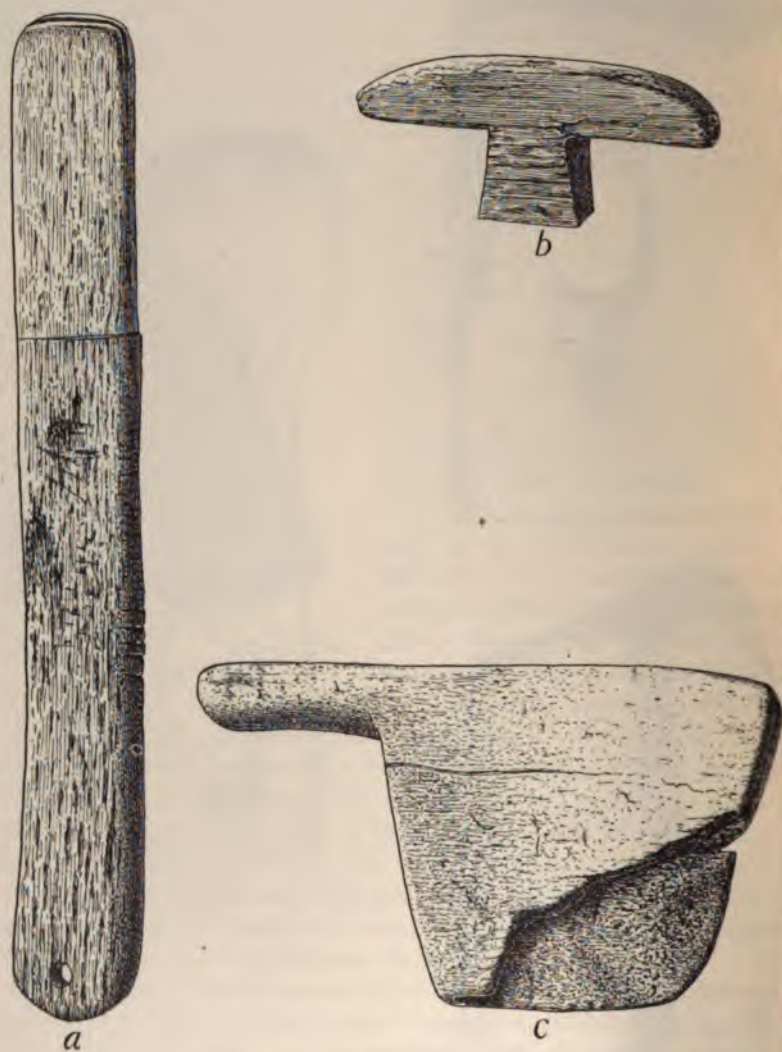


Fig. 16 (60.1-4480, 4405d, 4405e). Ulu and other Knife Handles. Length of *a*, 17 cm.

in which the heavy ridged handle, as in our Fig. 15a, is a separate piece and attached to the lower more slender shaft by thongs. Parts of such specimens were found at several sites in the vicinity of Etah, and at Parker Snow Bay, but none, as stated before, were found in Comer's Midden.

We frequently see in Eskimo collections a type of woman's knife figured by Porsild<sup>1</sup> which has a metal blade with a long narrow tang to the top of which is attached a cylindrical piece of ivory or bone. No such pieces of ivory or bone were found in any of our sites. However, there are some modern examples of metal knives picked up from the surface having such handles. One may suspect, therefore, that this type is particularly recent in West Greenland.

#### WHETSTONES.

Two pieces of sandstone regularly cut and rectangular in cross-section were found. Both had rubbed surfaces as if used for whetting metal tools.

#### SPOKE SHAVES.

From Comer's Midden we have one specimen (60.1-4409) which may be characterized as a spoke shave. What we have, as in other cases, is simply a haft minus the blade. This piece is of antler about 12 cm. in length and slightly curved. In the middle of one edge is a very narrow slot about 3 cm. long, presumably for a metal blade. This object is particularly well-preserved and comes apparently from the surface.

#### SNOW KNIVES.

Comer's Midden returned a large series of snow knives, though most of them are broken. Such knives have been thoroughly discussed by Thomsen.<sup>2</sup> It appears from this discussion that such knives have not heretofore been returned from West Greenland, though since they occur around Hudson Bay and Cumberland Sound as well as in East Greenland, their present appearance in Northwest Greenland was to be expected. All those from Comer's Midden seem to be of a slightly different type from those found in

<sup>1</sup> Porsild, Morten P., "Studies on the Material Culture of the Eskimo in West Greenland" (*Meddelelser om Grønland*, vol. 51, Copenhagen, 1915), 212, Fig. 47.

<sup>2</sup> Thomsen, *ibid.*, 421-424.

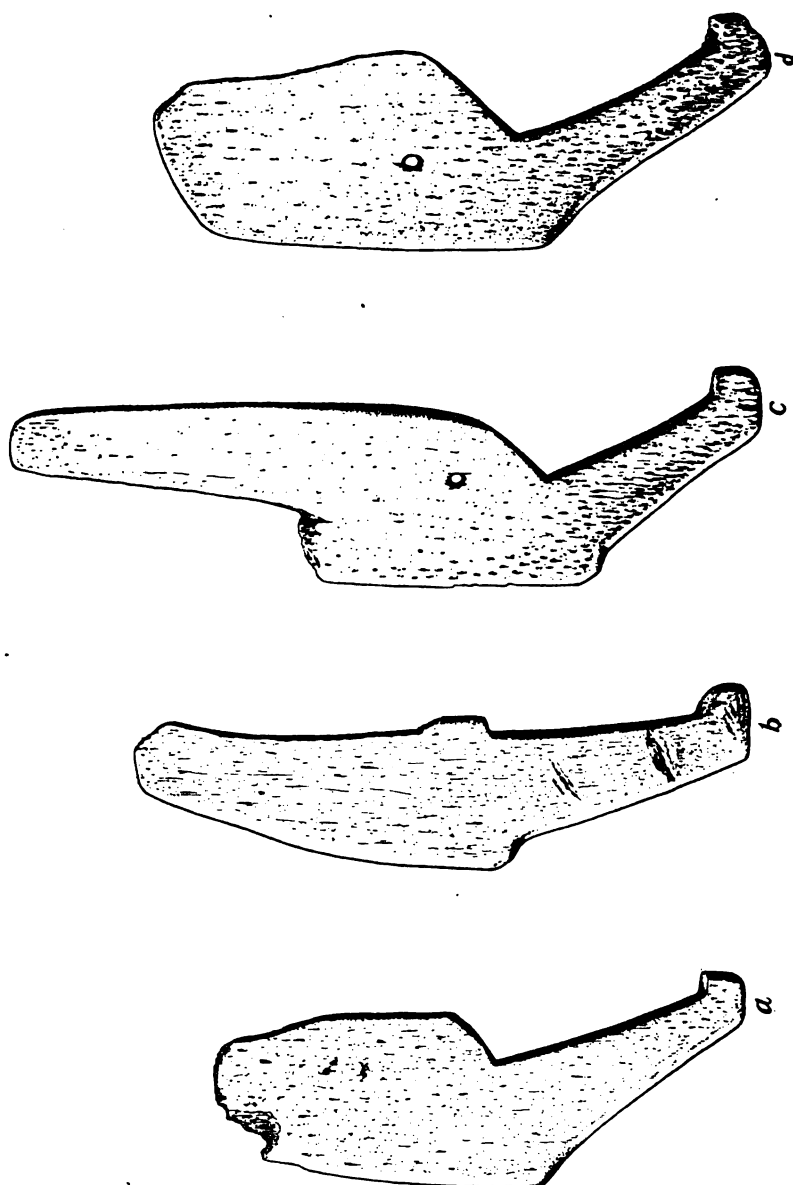


Fig. 17 (60.1-4403a-d). Snow Knives. Length of a, 18.5 cm.

**East Greenland.** The difference is chiefly in the prominence of the upper shoulder or guard which is a notch similar to the lower shoulder in East Greenland snow knives, but, as will be seen from the illustration of specimens from Comer's Midden, the upper part is usually formed by a sharp curve in the handle. Two of the knives, however, as in Fig. 18a, have a small prominence on the back to serve as a guard. Yet, with these slight

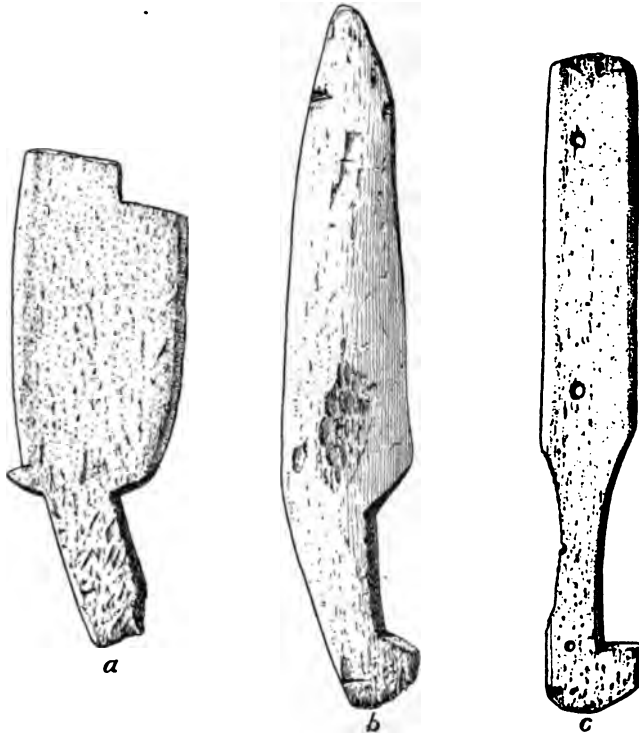


Fig. 18 (60.1-4403e-g). Snow Knives. Length of a, 18 cm.

variations, we have in Comer's Midden both types of knives described by Thomsen as characteristic of East Greenland. As previously stated, fragments of such knives were more frequent in Comer's Midden than any other object. The fragments consisted of knobbed ends of handles, slivers and pieces of blades. All are of bone and some show exceedingly fine workmanship. There are a few fragments of bone blades so nicely made and with such keen edges that their mere use for snow knives may be questioned.

But since they are of the same material and since no other handles were found which seem to fit them, we may assume that they are parts of blades for knives of similar shape, if not actually parts of snow knives.

As stated by Thomsen a simple straight knife of ivory is frequently used as an ice scraper for kayaks, both in Greenland and elsewhere. No ivory knives were found in Comer's Midden, for, as stated elsewhere, ivory was exceedingly rare, but part of a bone knife was recovered which suggests this form (Fig. 18c). That the prevailing type of snow knife was not peculiar to Comer's Midden was indicated by a precisely similar specimen from another site on North Star Bay. Again, from the sites at Etah we have several good examples of such knives. So far as their completeness permits, these are of the type of Fig. 17. All are of bone and greatly weathered, as if of considerable age. Of more frequent occurrence at the Etah sites is another type made of ivory, bone, and antler. This is long, slender, and sword-shaped.<sup>1</sup> All are new, showing little or no weathering. This type does not appear in Comer's Midden, though there is a single fragment of antler suggesting such a blade. However, this being the only possible example as opposed to the great number of the other type, the above noted difference still stands.

It seems, therefore, that the type of snow knife from Comer's Midden has slight individualities of its own, but is otherwise strictly comparable to those from East Greenland and Hudson Bay. Hence, they belong to the older substratum of Eskimo culture and presumably to the earliest period of occupation of Comer's Midden and the Smith Sound district generally, being contemporaneous with the old type of iron-bladed knife previously described.

#### THE ADZE.

It is now clear that we are justified in assuming that the site known as Comer's Midden was occupied as early as any yet known in Northwest Greenland. Hence, a full description of the collection made by Captain Comer is necessary. Unless otherwise stated, all the succeeding references to specimens will be from that site.

First, we may note that five adze heads were secured, three of which are shown here (Fig. 19). Those figured have rather large sockets suggesting stone blades, but there is another that must have carried a thin metal blade. As may be inferred from previous statements, no pieces of stone suitable for these hafts were found, but there is nothing in the forms of the figured specimens to preclude the use of such stone blades. The forms of these adze hafts are quite uniform with those of East Greenland and again with those

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<sup>1</sup> Kroeber, *ibid.*, Fig. 2.



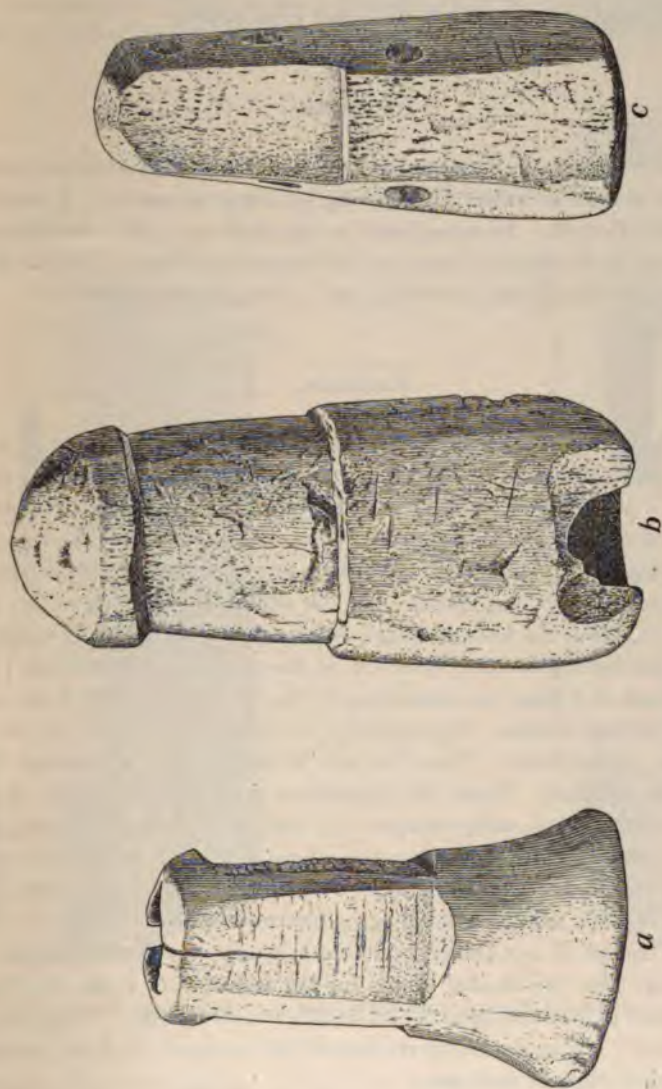


Fig. 19 (00.1-4392a-c). Adze Heads. Length of *a*, 8 cm.



of Alaska.<sup>1</sup> Fig. 19c has three lateral holes for the binding cords and Fig. 19a reminds one of Solberg's type.<sup>2</sup> Fig. 19c is also precisely like a Baffin Land piece.<sup>3</sup>

No adze heads were found at the other sites visited.

#### ICE PICKS.

To the butt end of a harpoon or lance shaft is usually attached a sharpened piece of bone or antler for breaking ice when necessary. A number of these were collected. All were joined to the shaft by a plain bevelled splice and two had holes through them as if for securing by lines. Similar objects have been noted for East Greenland and in fact all the Eskimo.<sup>4</sup>

#### HAMMERS.

From many of the sites about Etah we have hammers made of antler, all in one piece, the hammer head being a large shaft and the handle a section of a tine. All of these show very little weathering and are therefore presumably recent. Now, though there is an abundance of worked antler in the collections from Comer's Midden, there are no examples of such hammers either complete or in fragments. On the other hand, we have the object shown in Fig. 20a, the ends of which show indications of use as a pounder. Its most interesting feature, however, is the series of perforations. From front to back is a large one measuring 6 cm. at the back and 4 cm. at the front in vertical section. Horizontally, it varies from 2 cm. at the back to one cm. at the front. From the size of this opening we assume that a handle was inserted. From the dimensions given it will be seen that the handle would have a wedge-shaped end similar to hafts used in our own tools. In addition to this perforation, there is a small lateral one passing from side to side through the middle of the larger. This has been formed by two drill holes, side by side, giving a perforation about 15 mm. by 8 mm. If we are correct in our assumption that a handle was inserted in the large perforation, then the smaller one is for the insertion of a pin or a lashing of some kind to hold the head of the hammer to its handle. While this may be an entirely erroneous interpretation of the specimen, its form, markings, etc., certainly suggest such use.

<sup>1</sup> Thalbitzer, William, "Ethnological Description of the Amdrup Collection from East Greenland" (*Meddelelser om Grønland*, vol. 28, Copenhagen, 1909), 448.

<sup>2</sup> Solberg, *ibid.*, Plate 7.

<sup>3</sup> Boas, *ibid.*, 381, Fig. 175a.

<sup>4</sup> Thomsen, *ibid.*, 393.

## MATTOCKS.

A conspicuous object in the collection is the large heavy bone mattock with notched edges for lashing to a handle, a type familiar in collections from

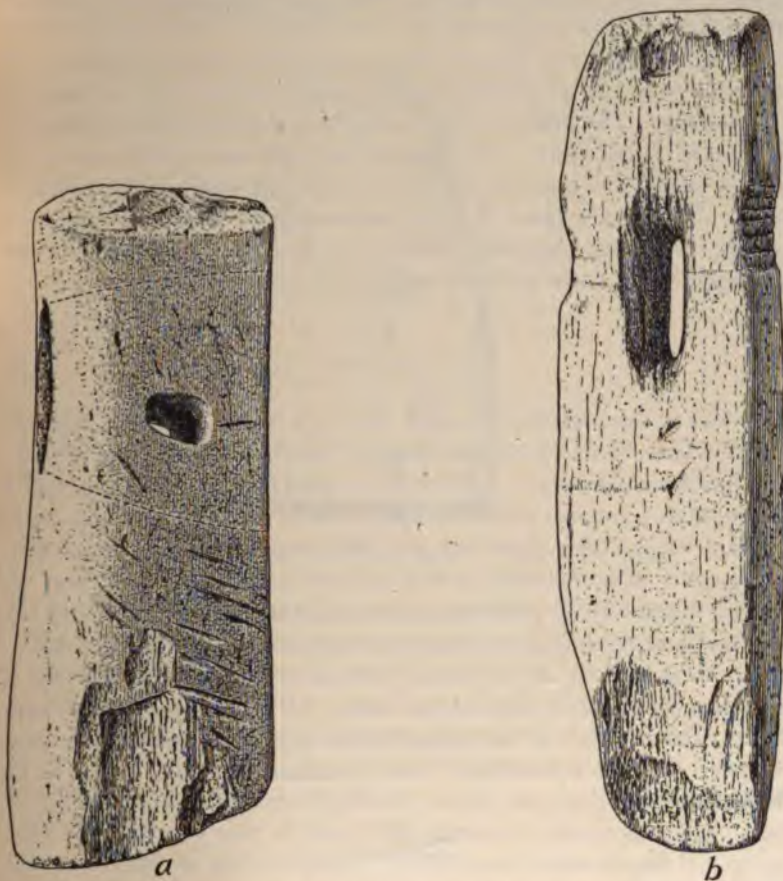


Fig. 20 (60.1-4393, 4395). A Maul Head and a Mattock. Length of *a*, 15 cm.

Hudson Bay and Alaska. All of the specimens found here are precisely similar to those from the older sites in Southampton Island figured by Boas.<sup>1</sup> Further description is, therefore, unnecessary. Similar mattocks were

<sup>1</sup> Boas, *ibid.*, 416, Fig. 214.

found at several of the sites in the vicinity of Etah. This fact, taken with the general wide distribution of this type to the west, indicates that it is one of the old and fundamental traits of Eskimo culture.

There are, however, three pieces in the collection resembling the mattocks just described, except that they are shorter and bear, near the hafted end, a perforation large enough to take a handle. One of these is shown in Fig. 20b. As may be seen from the drawing there are two slight notches on each side opposite the perforation, as if for lashing. In fact, there is a slight groove on the surface of the specimen passing from these notches into the perforation and out, precisely like one should expect from the long wear of the lashing. The manner of attaching this mattock or ax blade, as the case may be, is not clear. The form of the perforation leads one to doubt that the handle was inserted according to the European method while the tracings of lashing suggest that the perforation is merely for the sake of inserting the binding elements. However, this does not dispose of the case which must be set down as one of the problems of the future.

#### SLEDGES.

We find in the collection one cross tree for a sledge, similar to specimen figured by Boas,<sup>1</sup> and several fragments of bone sled shoes. One of these more than 40 cm. in length. All have the usual holes for attaching and one piece contains a number of wooden pegs still in place. The form, manner of drilling, etc., in these shoes does not differ from that described for Greenland sledges.<sup>2</sup> The materials in this case are bone. No ivory shoes were found in contrast to the collections from the other sites. Practically every site in the vicinity of Etah returned ivory sled shoes. These are of different pattern, varying from ten to twenty centimeters in length and joined one to the other by a pair of countersunk holes. All seem to be of recent manufacture. The inference is, therefore, that the type of sled used by the people of Comer's Midden, is the older West Greenland type, also found in East Greenland.

#### TOGGLES.

Toggles of the type used in dog harness were fairly numerous. The older, more weathered, specimens were of bone; the newer looking ones of ivory. There is nothing about them that is distinctive.

No swivels were observed such as are found around Hudson Bay.

Boas, Franz, "The Eskimo of Baffin Land and Hudson Bay" (*Bulletin, American Museum of Natural History*, vol. 15, part 1, 1901), 38, Fig. 47.  
Mason, *ibid.*, 412-417.

## KAYAKS

No parts of kayak frames or paddles were found, but there are a number of bone objects which seem to have served as paddle tips. Fig. 21 may be taken as the type. They vary in size from 8 to  $1\frac{1}{2}$  cm. Several, including the smallest one, contained fragments of the wood to which they were

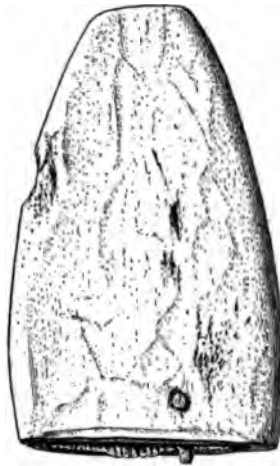


Fig. 21 (60.1-4407). Tip for a Kayak Paddle. Length of a, 8 cm.

attached. Thalbitzer,<sup>1</sup> illustrates the "model of an old-fashioned kayak paddle" which bears tips similar to the above. No such objects were found at the other sites.

## BOWS AND ARROWS.

No indications of bows were observed, except one doubtful fragment of bone which resembles a part of one of the plates in a compound bow. On the other hand, arrows are in evidence. First, as to arrow-heads, it may be stated that no metal or stone heads were found, nor do any of the foreshafts show signs of having carried such points. All of the heads found are of antler or bone and complete in themselves. All have pointed tangs for insertion in the shaft bearing lateral spurs in pairs, but not placed opposite each other. As stated by Porsild and others, arrow-heads of this type from

<sup>1</sup> Thalbitzer, *Amassalik Eskimo*, 386, Fig. 91.



West and South Greenland often bear threads for screwing into the shaft. The Danish school of ethnologists have assumed that the lateral spurs occurring on the other specimens found in Greenland are rudiments of this same screw thread. It seems, however, more likely that the screw thread is a modern innovation suggested probably by European models, while since we find the spurs distributed entirely across the continent to Alaska we may assume this to be the older form and that it is not necessarily related to the threaded tang.<sup>1</sup>

As to form, the bone heads from this collection resemble the two main Greenland types as enumerated by Thomsen<sup>2</sup> one with a long oval blade, the other with a single barb at one side. Though on Greenland heads of this character there are often several barbs, all the specimens from this site have but one. No indications of property marks, such as are numerous on Western Eskimo specimens, came to notice. There were, however, one or two slight attempts at decoration by incised lines.

Blunt heads for bird arrows were rather numerous, made both of wood and bone. Some were rather large and heavy. Since in almost every case the tangs or other attachments have been broken away, it is not clear how they were fastened to the shaft. There is, however, one complete specimen which indicates that the method was by splicing, a trait quite characteristic of Hudson Bay. This point is of some interest since when the Smith Sound Eskimo were met by Ross in 1818, the bow and arrow were absent, but are known to have been introduced later by Cumberland Sound Eskimo whence their use was common for a short period. According to Thomsen, all the arrow-heads of this period were joined to the shaft by the oblique form of splicing, which is, of course, the method employed by the Eskimo of Cumberland Sound and Hudson Bay.

It is interesting to note that our collections from the vicinity of Etah contain few arrow-heads and such as there are have been spliced in the above manner. One may infer, therefore, that they belong to this period of recent contact with the Western Eskimo. Hence, the arrow-heads from Comer's Midden and North Star Bay belong to a period when such implements were in use in Northwest Greenland. Further, since something of the same kind occurs in the old collections from Northeast Greenland and it is the form of arrow-head distributed from Hudson Bay to Alaska, and is also not entirely absent from collections around Hudson Bay and Cumberland Sound, we must consider its presence in Comer's Midden an indication

<sup>1</sup> Porsild, Morten P., "The Principle of the Screw in the Technique of the Eskimo" (*American Anthropologist*, N. S. vol. 17, no. 1, 1915); Laufer, Berthold, "The Eskimo Screw as a Culture-Historical Problem" (*American Anthropologist*, N. S., vol. 17, no. 2, 1915).

<sup>2</sup> Thomsen, *ibid.*, 404-405.

that the people occupying this site belonged to the older period of Greenland history.

In this connection it may be noted that there is one bone head for a metal blade which has the form of a figure in Thalbitzer.<sup>1</sup> It is very large for an arrow as is the one cited above.

#### BIRD AND FISH SPEARS.

A number of barbed pieces of various sizes, made of bone and antler, such as are used on bird spears and fish spears, were found. There is nothing about them that differs in any particular from those already described for Greenland and elsewhere. There are, however, two kinds of objects in the collection, all made of wood, which suggest a use as barbs for some kind of spear, but which we have not yet been able to identify. One of these is shown in Fig. 22. Precisely similar specimens were picked up at various places on the shore of North Star Bay and others from old house sites near Etah. They average about 6 cm. in length. In each case a portion of the base has been mortised out so as to form a shoulder, apparently for some kind of mounting. The remainder is notched as if for a binding cord. No objects of this kind have come to our attention, but they remind us of objects figured by Boas<sup>2</sup> which though of bone are of approximately the same size and of somewhat the same form. Professor Boas was unable to find any explanation for these, but Waterman<sup>3</sup> found in a later collection from old house sites at Lyons Inlet, Hudson Bay, made by Comer in 1910, the mountings for these barbs, suggesting that they were in fact barbs for fish spears. As such, they differ radically from the barbs upon fish spears found in collections from living Eskimo. The method of attaching the object in Fig. 22 differs somewhat from that employed for the bone and ivory barbs noted by Waterman, but this may be due to the fact that they are of wood. Anyway, it seems certain that the wooden objects we have noted are similar barbs for fish spears. A number of the sites near Etah returned fragments of fish spear heads in which the barb was thrust through the side strip



Fig. 22 (60.1-4406a). Wooden Barb for a Fish Spear. Length, 5.5 cm.

<sup>1</sup> Thalbitzer, *Meddelelser om Grønland*, vol. 28, 366.

<sup>2</sup> Boas, part 2, 391, Fig. 185.

<sup>3</sup> This series, vol. 4, part 2, 301.

precisely as observed upon spears in collections from the living Eskimo. No such parts were found in the midden where the above-noted wooden barbs appeared, nor did they occur in other sites yielding this same wooden barb. All this is consistent with the view that the specimens figured are barbs for fish spears.

The second problematical object, numerous examples of which were found in Comer's Midden and occasional examples at other sites near Etah,

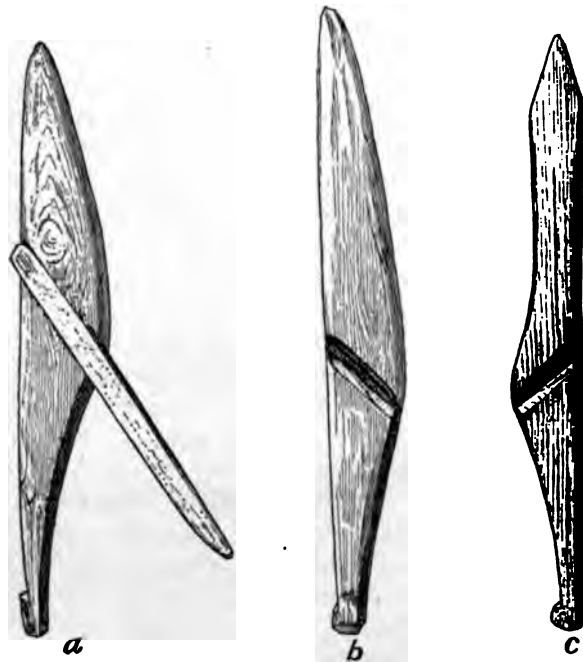


Fig. 23 (80.1-6691, 4406b, 4406c). Gull Hooks. *a*, Hudson Bay; *b* and *c*, Comer's Midden. Length of *a*, 10.5 cm.

is shown in Fig. 23b. They average about 12 cm. in length and are, without exception, made of wood. They are rather flat, though sometimes approaching a circular cross-section, and obliquely across the widest part is a groove of considerable depth. The tapering end is usually provided with a knob or, in some cases a kind of spur, while the opposite end is brought to a blunt point.

The only objects suggesting these are figured by Thomsen<sup>1</sup> as prongs

<sup>1</sup> Thomsen, Plate 17.

for fish spears. From the measurements given, they are slightly longer than the objects here described, though nothing is said of the oblique groove across their body. Otherwise, they have the form and character of the objects we are considering. Thomsen regards his specimens as peculiar since there have not come to his knowledge any prongs for fish or other spears that were made of wood. We hesitate to base any conclusion upon the peculiar resemblance between these objects from East Greenland and from Northwest Greenland, but if it should turn out that they had a similar use, we shall have one of the most suggestive parallels yet brought to notice.

On the other hand, Captain Comer took from a house ruin south of Wager River, west of Hudson Bay, the object shown in Fig. 23a. This one had a bone barb in the groove where it fits so snugly that it cannot be pulled out easily. This adds great interest to these objects since there can be no doubt as to the identity of this form with those from North Star Bay.

As to the use of this object, we are in doubt. It has been suggested that it is a fish hook, but Captain Comer was told by natives at Etah that it was an implement for taking gulls. The wood causes the hook to float and, if properly baited, will be gulped by a gull.

Now, though we may be in some doubt as to the function of the two kinds of objects just described, the significance of their distribution is clear. For the second (Fig. 23), we have identity between West Hudson Bay and Northwest Greenland and probable identity with Northeast Greenland. For the first (Fig. 22), we have a close similarity between West Hudson Bay and Northwest Greenland. All are absent in collections from the living Eskimo. The only fish spear reported that suggests the first form of barb, is one from Alaska figured by Nelson.<sup>1</sup> We have then another fine example of widespread identity in the earlier levels of Eskimo culture.

#### HARPOONS.

There are a large number of harpoon heads in the collection. All are of two general types, those represented by Fig. 24 and the more familiar type of harpoon which differs from the preceding in that the foreshaft rests in a closed socket. It will be noted that in the illustrated specimen the end of the foreshaft rests in an open socket held in place by lashing. A comparison of this type with specimens from old sites in Southampton Island shows a remarkable similarity. There is, however, one point of difference. A

<sup>1</sup> Nelson, E. W., "The Eskimo about Bering Strait" (*Eighteenth Annual Report, Bureau of American Ethnology*, part 1, Washington, 1896), 150, Fig. 42 and Plate 67.



number of Southampton Island specimens have lateral barbs of the original material, a feature also found in some East Greenland and West Greenland harpoon heads. No such barbs are found on any of the heads at Comer's Midden, though a few examples were picked up near Etah. As will be noted in the illustration, the harpoons of the first type fall into two groups, those having a point of bone, or in which the harpoon is made of a single piece, and those having detachable points of slate or metal. As may be inferred from previous statements, no stone or metal points were found; yet, the form of the groove for the point in most of these specimens suggests metal blades. All of the heads of the second type, none of which are figured here, had detachable points, presumably of metal. Their end barbs are of two forms, a single point, as in case of the other type (Fig. 24a) and a double

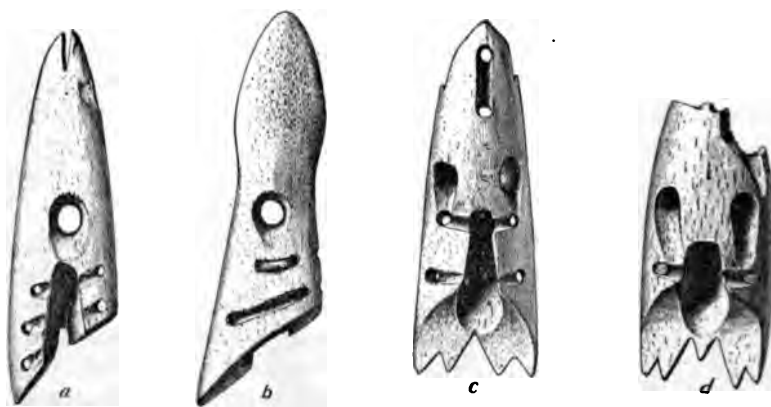


Fig. 24 (60.1-4416, 4430, 4418a-b). Harpoon Heads of Bone. Length of a, 8.2 cm.

or notched point such as is frequent on specimens from Hudson Bay and recent specimens from Smith Sound and elsewhere. For both types the material is almost universally bone. The few ivory heads returned are reasonably new and according to Captain Comer's notes were found near the surface. They are also almost without exception found among those of the second type.

It is generally assumed that the harpoon heads with open sockets, as in Fig. 24, are older than those with closed sockets. One reason for this inference is that this type prevails in the old sites at Southampton Island. This form is not conspicuous in collections from other parts of Greenland, harpoon heads here being almost exclusively those of the second, or more recent type. Whatever else this may signify, it is consistent with the assumption

that the lower levels of Comer's Midden are contemporaneous with the older sites at Southampton Island. Nevertheless, both types of harpoon occur in the Midden with equal frequency, so that it may be inferred that the two types were to some extent contemporaneous; but even in that case it must be assumed that the culture at Comer's Midden is reasonably old or, at least, old enough to show definite survivals of the older antecedent culture.

All of the heads so far considered are of a size to suggest their use for seals or similar animals. There is, however, one fragment of a much larger harpoon head which must have been for whaling. Unfortunately, we have only a portion of a specimen, but from this it appears to belong to our second type, those having a closed socket and a short double-pointed end barb. It differs from whale harpoons from western North America in the shortness, or stubbiness, of the end barbs, but in this respect resembles its companion sealing heads.

A few examples of retrieving points for darts or lances may be noted. These, without exception, are barbed on one side only and in most cases have two line holes. However, their forms are too much like the generalized Eskimo type to warrant a comparative statement.

A number of foreshafts and fragments of the same were observed, but these are of the ordinary type figured in my discussion of the Stefánsson collection.<sup>1</sup> A few sockets for the same were observed. There were no examples of the familiar Greenland type of joint in which a kind of tenon fits into the socket on the shoulder of the shaft. Examples of this were picked up at some of the Etah sites, but in every case lacked weathering and other marks of age. From the nature of the end sockets, we infer that the shafts were of wood, though no pieces of suitable size were recovered. Also the socket piece slipped over the end of the shaft and was not fastened by a tang or oblique splice.

There were no throwing boards. Neither were there any examples of the peculiar hinged harpoon head observed in Greenland collections. Among other missing objects may be mentioned the sealing stool.

#### LAMPS AND KETTLES.

Though there are many fragments of steatite vessels, these are not sufficiently complete to give us an idea of the original form. There is, however, a miniature lamp which is of the precise Smith Sound pattern as described by Boas.<sup>2</sup> Yet, the most interesting feature is a large stone slab

<sup>1</sup> This series, vol. 14, part 2, 428, Fig. 44.

<sup>2</sup> Boas, part 2, 440-441.

with ridges of cement around the edges, suggesting a lamp of the Southampton Island type. The shape of this piece also suggests the Southampton Island lamps. We may therefore, feel reasonably certain that this same type of built up lamp was known to the inhabitants of Comer's Midden. As to the type of kettle, we are not clear, though the fragments would indicate round or oval forms.

#### HOUSEHOLD UTENSILS.

Under this head are several fragments of small horn spoons, portions of wooden spoons, and fragments of vessels of wood. Unfortunately, the wooden objects are too fragile to make their forms clear.

There is also an example of the coopered tub, or vessel, represented by two incomplete staves. The groove for the bottom is intact and carries one or two wooden pins with which the attachment was made. There are also a number of bottoms for similar vessels in more or less complete condition, indicating that such tubs were circular in cross-section. Objects of this kind have been described both for West and East Greenland so that no further comment is necessary.

#### MISCELLANEOUS OBJECTS.

Among the many other objects deserving notice are numerous rims of drums or buckets, highly perforated by small drill holes. These are particularly numerous in the collections from Etah.

There are something over fifty pieces of worked wood. Most of these are mere fragments or discarded pieces, but among them we find a number of human figures of the usual conventional form. A few similar figures of ivory were found on the surface of the Midden. So far as can be observed, there is nothing in their characteristics to differentiate them from other Eskimo carvings in Greenland.

There are a few examples of drum handles and one possible fragment belonging to a cup-and-ball game.

Among the highly problematical objects are a few curious bracket-like forms of a size sufficient to hold a harpoon or lance shaft, but as we have seen nothing like these in any other collections and the ones observed seem to be unfinished objects, no further comment is necessary.

## WORK IN WHALEBONE.

This completes the description of the most important objects in Comer's Midden with the exception of examples of work in whalebone. These are strikingly numerous and deserve to be described in some detail. For one thing, we have many fragments of notched and looped strands of whalebone, suggesting nets. As to the use of a whalebone net for seals or other game in West Greenland, we have no very definite knowledge. Thalbitzer and Porsild, however, are responsible for the statement that nets of whalebone were formerly in use in Greenland. It is certain that none have been used for many years. Of course, we cannot be sure that these fragments are parts of nets, but the manner of the knots makes it strongly probable. Another interesting object is what seems to be a drying rack formed by bending strands of whalebone and tying as shown in Fig. 25. Several examples of this were dug up.

There is one large piece of whalebone the size and shape of a sled shoe and perforated in a similar manner. Whether this is a correct interpretation of its use we cannot say.

Fig. 27 is a large knife-like object 42 cm. in length. According to Murdoch, the natives of Alaska have used whalebone for knives. Since the material will take a keen edge it may be inferred that the object shown here was used as a knife.

Fig. 28 is peculiar in that it has a perforation near the larger end. It is also notched as if for wrapping. As to its use, we have no conjecture.

Fig. 29 is evidently a toggle. Figs. 26a and 26c, are of unknown use. Among the many other objects may be mentioned two top disks, a carving representing a fish, part of a knife similar to the figured specimen and a nail, or skewer-like object, reminding one of the ivory pins used for closing wounds in seals. Lastly, in Fig. 26b we have a handle of an implement, probably a knife, which seems to have been made in imitation of an animal head.

Judging by the meager accounts of work in whalebone, this collection is somewhat unique. There was a great deal more in such a fragmentary condition that it could not be recovered. According to Captain Comer's observation, the greater part came from the lowest levels of the deposit, presumably belonging to the earliest period of occupation at this particular site. All of the pieces in the collection are greatly frayed and shredded, making it very difficult to do more than determine their general outlines; nevertheless, what remains shows great technical skill as, in fact, do all the objects from this deposit.



[ Fig. 25 (60.1-4445). Fragment of Whalebone Mat or Drying Rack. Length, 24 cm.

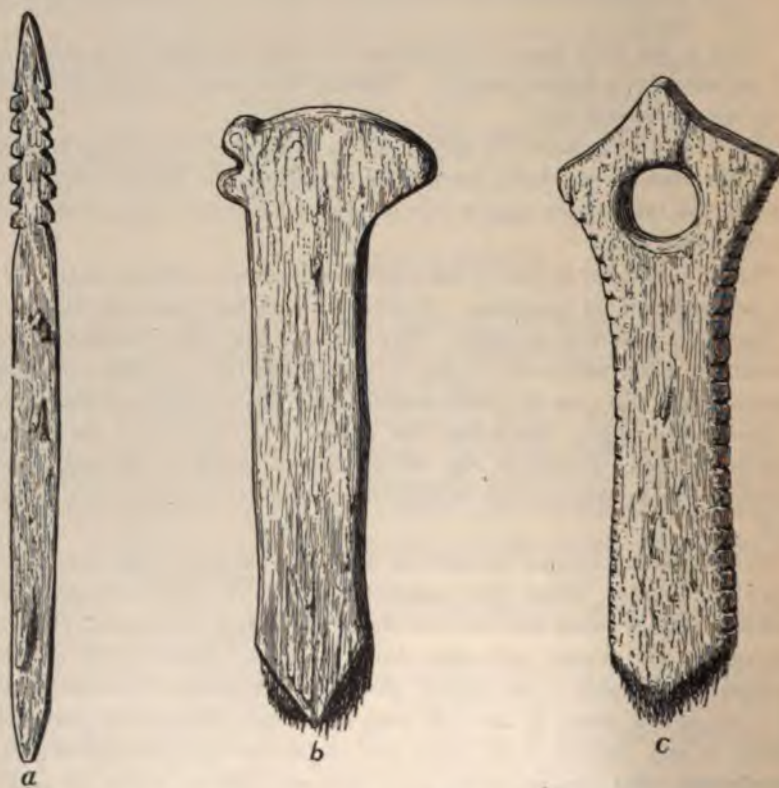


Fig. 26 (60.1-4401, 4455, 4437). Objects of Whalebone. Length of a, 13.5 cm.



Fig. 27.



Fig. 28.

Fig. 27 (60.1-4440). A Knife of Whalebone. Length, 42 cm.

Fig. 28 (60.1-4441). Unidentified Object of Whalebone. Length, 61 cm.

A few examples of whalebone were collected near Etah, the most conspicuous being an implement handle larger than, but otherwise similar to Fig. 26b.

As noted before, a large percentage of the objects from Comer's site are made of whalebone; this prominence of whalebone artifacts in contrast with the rarity of ivory, suggests that whaling was an important feature of the old Eskimo culture at North Star Bay.

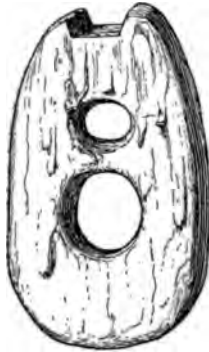


Fig. 29.



Fig. 30.

Fig. 29 (60.1-4456). Toggle of Whalebone. Length, 4 cm.  
Fig. 30 (60.1-5092). A Lance Head. Length, 17.5 cm.

#### STONE AND BONE POINTS WANTING.

When we consider the time and care given to the search for sites and the number examined, it is difficult to escape the conviction that in their totality they present about all that is to be expected in future exploration. Hence, the rarity of stone and bone points indicates a metal culture contemporaneous with the period of occupation. Yet, this does not agree with

the evidence for a stone age around Disko Bay and southward. If the above conclusion stands, then we must assume that the Eskimo occupation of North Star Bay and the Etah district was relatively recent. We have searched all parts of the collection carefully for even the merest fragments of bone points. The only ones in evidence are a few one-piece harpoon heads with points of the original material. The only example of what may be considered a bone lance or spear head is Fig. 30 from near Etah, and this is of such unusual form that its significance is not clear.<sup>1</sup>

#### DECORATED OBJECTS.

Ornamentation by incision or perforation was conspicuously absent in the midden. In fact, it is rare in all the collections since but three such

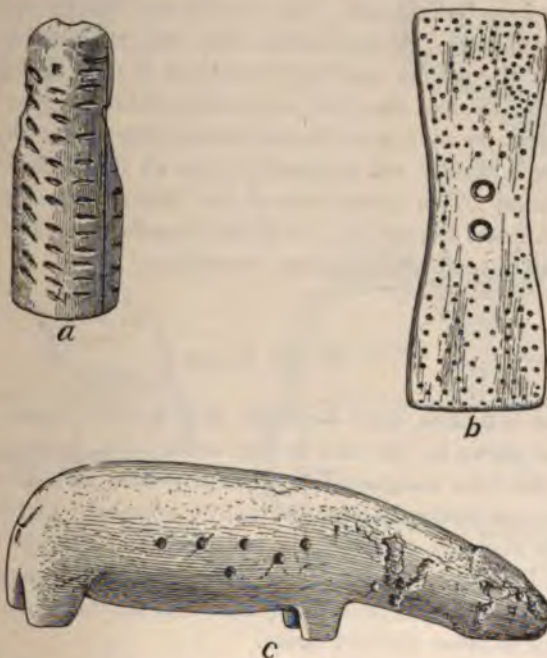


Fig. 31 (60.1-4675, 4678, 4701). Decorated Ivory Carvings, Etah. Length of *a*, 32 cm.

<sup>1</sup> As to the finding of this specimen Mr. MacMillan writes as follows:—It was found at an old igloo at Etah. All the old men agreed that it was a killing iron used in the capture of seal and walrus before the advent of iron.



objects were returned and these are of doubtful age. As previously stated, there are some examples of carving; from the midden there are eight human figures in wood and one surface piece, of ivory. Of other forms, there are no traces, except some new looking ivory figures, coming from the top of the deposit and a probable fish in whalebone. This, with the embellishment of Fig. 26b, exhausts the list. The other old sites at North Star Bay yielded no examples whatever.

On the other hand, some of the Etah sites gave a fair return in carvings, some in wood, but mostly in ivory. Here animal forms prevail in contrast to the preceding. The finish and technique is equal to that observed in modern collections from the natives of the vicinity. Also, the technique of the few midden carvings is equally high.

Turning now to decorated objects, the three previously mentioned were found in house ruins near Etah (Fig. 31a-c). Figs. *b* and *c* have been embellished by drilling, or dotting. Fig. *b* presents a technique precisely comparable to objects from Baffin Land. Fig. *a* is different since it presents notches in series, in two planes. As just stated, these objects are of ivory and without indications of great age and there is nothing in their appearance that is inconsistent with the idea that they were made within ten years.

In conclusion, we may note that decorated objects are absent from all parts of Comer's Midden and apparently from all the older sites examined by the expedition. This is also true of the Alaskan sites explored by the Stefánsson-Anderson Expedition. It is fair, therefore, to raise the question as to the place of such art in Eskimo chronology.

#### HOUSE PLANS.

No special comment need be made on Captain Comer's sketches of house plans as shown by the ruins he excavated. The figures give the type. All were of the form designated by Danish writers as pear-shaped. The double houses are evidently what Steensby's informant had in mind when she made the sketches appearing in his excellent paper on the Polar, or Smith Sound Eskimo.<sup>1</sup> A comparison of the other illustrations in this book with these plans of Comer will make clear that all these ruins were of the surviving type of stone and turf house.

Steensby has rather comprehensively reviewed the general distribution of Eskimo house types,<sup>2</sup> placing the center for the pear-shaped house at

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<sup>1</sup> Steensby, H. P., "Contributions to the Ethnology and Anthropogeography of the Polar Eskimos" (*Meddelelser om Grønland*, vol. 34, Copenhagen, 1910), 323.

<sup>2</sup> Steensby, H. P., "An Anthropogeographical Study of the Origin of Eskimo Culture" (*Meddelelser om Grønland*, vol. 53, Copenhagen, 1916), 187-203.



## RELATION OF COMER'S MIDDEN TO OTHER SITES.

Though we have continually referred to the finds from other sites, we have so emphasized those from Comer's Midden that a specific statement seems justifiable. The collections from North Star Bay, Saunders Island, and Parker Snow Bay contain many new objects, which show by their forms that they are of recent origin. Nevertheless, some house sites did yield objects suggesting the varieties of the midden. The same statements will apply to the collections from Etah. Nothing was found that belonged to a different level of culture from that of the midden, except that which clearly came from the historic Eskimo.

The historic inhabitants are the Polar Eskimo. They use the same type of house as the people of the midden and since their culture is otherwise very much the same, it is more probable than not, that we are dealing with the archaeology of the Polar Eskimo, whose descendants are still on the site and still adding to the midden.

We cannot clearly understand the position of the Polar Eskimo as a group unless we take into consideration the entire distribution of the Eskimo. The general tendency of the Eskimo has been toward a migratory form of life. In the ceaseless shiftings of his residence he has at one time and another occupied the entire Arctic coast line, as an examination of the accompanying map will show. This map shows the approximate location of Eskimo settlements reported within the past twenty-five years. The data for all the territory east of 100°, except that visited by the members of the Expedition, was taken from the maps of Thalbitzer<sup>1</sup> and Steensby.<sup>2</sup> For the Arctic coast of Canada the reports of the Stefánsson expeditions were utilized. The Alaskan sites were taken from many sources, but the National Geographic Magazine Map of 1914 was used as a check. The stippled area represents the total distribution of the Eskimo since their appearance on the coast, as indicated by the ruins of former villages and other evidences of Eskimo culture. In none of these particulars is it possible to attain a high degree of accuracy, but the relative distribution of the recent Eskimo population can be safely inferred.

The census of 1910 returned 14,087 Eskimo in Alaska, and the estimated number in Greenland is 11,790. The Canadian estimate is given as 1,300

<sup>1</sup> Thalbitzer, W., "A Phonetical Study of the Eskimo Language, based on Observations made on a Journey in North Greenland 1900-1901" (*Meddelelser om Grønland*, vol. 31, Copenhagen, 1904).

<sup>2</sup> Steensby, H. P., "An Anthropological Study of the Origin of Eskimo Culture" (*Sædtryk af Meddelelser om Grønland*, vol. 53, Copenhagen, 1916).

for Labrador and 3,447 for the coast. Tabulating the population estimates and the number of settlements indicated on the map, we have the following:—

	Number of Settlements	Population
Alaska (1910)	112	14,087
Greenland (1904)	69	11,790
Labrador (1915)	7	1,300
Canada (1915)	81	3,447
Siberia (1907)	12	1,200
Total population		31,824

The settlements do not count as separate villages and camps, but rather as localized groups of villages. They cannot be given with great accuracy, yet their gross distribution is a safe index to the clustering of the population. As the data stand the most compact settlements are in Greenland and Labrador, while the least dense are those of the Canadian coast.

Since the large dots on this map represent the locations of villages and camps in recent years, they give us the approximate extent and density of Eskimo population during the past half century. But this does not give an adequate idea of the territory covered during the whole period of Eskimo occupation. This we have indicated by the stippled coast belt. While we do not maintain that every square mile of this territory was at some time or other lived upon by Eskimo, the reports of travelers make it probable that one cannot travel many miles in any direction within these limits without encountering traces of this culture. The preceding pages show the archaeological richness of the regions occupied by the Polar Eskimo, but this is strictly comparable to the experiences of Danish explorers in all parts of Greenland. Again, in the west, Captain Comer at Hudson Bay and Stefánsson still further west were continually meeting with traces of former inhabitants. That this should be the case is not strange, for the Eskimo must always keep to the coast for winter sealing. His expansion was, therefore, linear only.

The position of the Polar Eskimo is now clearer. While in recent years they stand alone as the most northerly outpost, either their immediate ancestors or some other group occupied successively the whole of the north coast. That their present position represents a great shrinkage of population may be doubted; it is more likely a matter of shifting habitation. But the whole of Greenland is marginal and so seems most likely to have received its Eskimo population but recently.

The most acceptable theory of Eskimo origin is that they expanded from a parent group in the Arctic Archipelago.<sup>1</sup> In any case, no great antiquity

<sup>1</sup> Steensby, *Origin of the Eskimo Culture*, 204–218.

can be assigned to their expansion into Greenland. Danish authorities are in general agreement that the occupation of West Greenland did not begin earlier than 1200 A.D. and there is some reason to believe that it was 1400 A.D. before they had a firm footing there. How long the shores of Smith Sound and other parts of Northwest Greenland have been peopled is not known. We now know it to be the home of a small group of Eskimo, first noted by John Ross in 1818. They were then and are now the most northerly settlement, on which account the Danes call them Polar Eskimo. Peary's repeated efforts to reach the Pole from this side brought these people to notice, making them the most widely known of any. Their history and cultural position have been carefully presented by Steensby.<sup>1</sup> At one period of their known career, they seem to have discarded the bow and the kayak, but later took them up again. In culture, they are nearer the Central Eskimo than West or South Greenland; in fact, they are so near the former in contrast to the latter, that we must suspect their recent arrival from the Arctic Archipelago. Yet, the geographical conditions are peculiar, since the Melville Bay district is uninhabitable in winter, thus cutting easy communication between the home of the Polar Eskimo and the northern outpost of the West Greenland Eskimo. This, of itself, might account for the closer parallels with Central culture. It is also one of the reasons for taking the close resemblances to Northeast Greenland culture as indicating a movement around the north shore. It may be then, that we are not justified in assuming the late arrival of Eskimo in Northwest Greenland, but that they retained the typical culture longer because less marginal. Yet, on general grounds, the whole movement into Greenland seems recent, so recent that the appearance of iron in the culture of these Eskimo is not surprising.

#### GENERAL DISCUSSION.

In summarizing the preceding pages one of the first points to strike the reader is the absence from Comer's Midden of certain well-known objects; for example, needle cases, skin-working tools, bows for drills, nozzles for floats, throwing sticks, blubber pounders, bird bolas, goggles and eye shades, sealing stools, etc. It may be inferred that this indicates their absence in the culture of North Star Bay, but such a conclusion is scarcely warranted since only a small section of the accumulated camp refuse was dug out and furthermore, it is chiefly the unusable fragments of things that we find. Thus, it seems unwise to assume that when a single object is wanting in the

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<sup>1</sup> Steensby, *ibid.*, 268 *et seq.*

collection made, its use was unknown to the people in question. Yet, this objection would not apply to the case of ivory as a material, for if ivory was worked at all, slivers and fragments must certainly find their way into the débris in proportion to their relative number, unless it should be that a taboo against casting them out so near the sea operated in this case. Since ivory occurs scarcely at all in the lower parts of the heap and objects usually made of ivory are here made of bone and antler, such a possibility may be disregarded. Yet, except with respect to materials, negative evidence as to the use of specific objects should be disregarded. Again, some of these missing objects do occur at some of the Etah sites as stated under the proper heads. Since there is no evidence that some of these were not contemporaneous with the lowest layers of Comer's site, we may assume their absence at the latter as accidental. In view of these conditions, the important points in this discussion will arise from comparative studies.

In the preceding descriptions of objects found in Comer's Midden appear certain similarities to the older sites at Hudson Bay and again in Northeast Greenland. These similarities also hold, but to a less degree, for many of the sites examined around Etah. The collections made from all sites except Comer's Midden were in the main from old long-abandoned house sites. Naturally, mixed with them is surface material of more recent date, but this can be separated out without much difficulty and we have seen a strong tendency for this older Etah material to parallel the older levels of the stratified site discovered by Captain Comer. We assume, therefore, that all the older sites explored by this expedition are roughly contemporaneous.

As to their age, we must first of all consider the fact that stone tools are conspicuously absent and that signs of metal were in evidence at every turn, though but the faintest traces of iron and copper were met with. Nevertheless, in the older part of Comer's Midden, and even at certain obviously old sites near Etah we find a kind of knife haft, identical in form with the old stone age knife of Southampton Island, yet which must have carried iron blades. Since knives of this form were observed by early visitors to Smith Sound, the metal for which was assumed to be of meteoric origin, we are confronted with the possibility of considerable age. Unfortunately, close stratigraphic studies of Comer's site were not made, but it appears that the knives using iron of this character are from the lowest levels of the deposit. Higher up were those of a more recent type: viz., a long strip of iron set in a groove. The latter belong to the historic period when traders began to supply the Eskimo of Greenland with iron and other objects. As to the age of the former, we can but speculate. Yet, there is no reason for assuming a great interval. For aught we know, all of the sites



examined by the expedition are less than four hundred years old, but in that case some of them must certainly belong to the first century of that period. Naturally, if meteoric iron was in general use this period can be increased by several centuries.

Scandinavian authorities<sup>1</sup> on the Eskimo have carefully considered the significance of these facts. On the whole, they are rather puzzling, for we have on the one hand every indication of a respectable age and extensiveness for this iron culture and on the other, no satisfactory data as to native sources of supply. That some meteoric iron was used is considered certain, but that all of the older tools in the collections described here and similar ones in Scandinavian museums could have been supplied from meteoric sources is difficult to believe. Danish authorities have sought other sources and have put forth claims for telluric iron.<sup>2</sup> This, if substantiated, would put a new face upon the whole problem, for then there could be no objection to accepting the other consistent evidences of age attached to the sites in question. The use of iron would then be a natural development out of the stone age of Eskimo culture, influenced no doubt by their experience with copper west of Hudson Bay. Yet, Dr. E. O. Hovey, a geologist of the expedition, denies the presence of telluric iron in the Cape York-Smith Sound region, and makes it reasonably certain that the iron first used by the Polar Eskimo was of meteoric origin. He has been kind enough to contribute the following review of the case.

The Use of Meteoric Iron by the Polar Eskimo — Dr. E. O. Hovey.

The so-called Cape York or Smith Sound tribe of Eskimo were discovered by Captain John Ross, R. N., in 1818 when he made what was practically a pioneer voyage across Melville Bay in quest of the Northwest Passage. He reported that these people whose very existence had not been suspected before except through the vague traditions of the Eskimo of southern Greenland, were using knives and harpoon points edged with bits of iron. Ross gathered from the natives that the metal had been obtained from a locality on the shore of Melville Bay just north of and near Bushnan Island. One of them, Meigack (My-ahq?) by name told him that the iron "was found in the mountain before mentioned; that it was in several large masses, of which one in particular, which was harder than the rest, was a part of the mountain; that the others were in large pieces above ground and not of so hard nature; that they [the people] cut it off with a hard stone, and then beat it flat into pieces of the size of a sixpence, but of an oval shape."<sup>3</sup> The locality being some twenty-five miles back on the route which had been traversed, Ross was unable to visit it on account of the demands of his voyage, but he secured some of the knives, one of which, with a

<sup>1</sup> Thalbitzer, 483-492; Thomsen, 430-433; Solberg, 20-21, 54.

<sup>2</sup> Thalbitzer, 489.

<sup>3</sup> John Ross, *A Voyage of Discovery*, 104. London, 1819.

cutting edge about seven inches long, is figured in his book. He surmised that the masses of iron were meteoritic in origin, an opinion which was confirmed by the celebrated English chemist, W. H. Wollaston, to whom the fragments were submitted on the return of the expedition and who determined the presence of nickel in the iron.

Rear Admiral R. E. Peary, U. S. N., states<sup>1</sup> that nearly every expedition since Ross has had for one of its objectives the discovery of the actual source of this iron, but none was successful in its quest. Even Baron N. A. E. Nordenskjöld, the Swedish explorer who collected the great masses of telluric native iron on the island of Disko, Danish Greenland, failed to reach the locality, when he went to Cape York in 1883 for the express purpose of finding the northern Eskimo iron in place. Thus was it left to Peary himself to be the first white man to see the mysterious masses from which the Smith Sound Eskimo got their precious metal from time immemorial, until the frequent visits of whalers and scientific expeditions and, finally, the establishment of the Danish trading station at North Star Bay kept up a supply of manufactured iron in comparative abundance. On 27 May, 1894, R. E. Peary with Hugh J. Lee and two Eskimo guides Tah-lah-ko-te-ahq and Kes-s'oo uncovered the snow from one of the iron masses forming the group of "Cape York" meteorites, and their actuality and true character were revealed. In 1895 Peary revisited the locality with the steamer "Kite" and brought away the two smaller of the three masses then known. He saw the largest of the three masses on this trip but was unable to make any attempt at its removal. He was there again in 1896 with the steamship "Hope," but his apparatus was too weak for the task of moving and loading the great mass and he was obliged to relinquish the task. Again in 1897 the "Hope" took the indefatigable Peary to Meteorite Island and this time he was successful in bringing away the prize. Some years later the three masses, known as Ahnighito, weighing about thirty-seven tons, the Woman about five thousand pounds, and the Dog about nine hundred pounds were acquired by the American Museum of Natural History and placed on public exhibition.

For many years these three masses were supposed to comprise the whole of the Cape York series, but the Eskimo knew of a fourth large mass and in the spring of 1913, Kood-look-tohq led the famous Danish ethnologist Mr. Knud Rasmussen to it. The following year Rasmussen took Mr. W. Elmer Ekblaw, geologist of the Crocker Land Expedition, to inspect and report upon the block, which lies on the mainland back of Bushnan Island about three thousand feet above the sea and about ten miles east of north of the area where the Peary group were found. Mr. Rasmussen has presented the find to the Royal University at Copenhagen and the mass will be secured after the war is over.

Like its fellows, this eight-ton mass was surrounded by bowlders of trap which the Eskimo had brought in the almost forgotten past to use as hammers in breaking off chips and slivers of iron for use in making knives and harpoons. Both Peary and Rasmussen describe the manner in which the Eskimo illustrated to them the process employed by their ancestors in winning the desired metal. Narrow edges or ridges of the masses were laboriously hammered on with the bowlders, until small flakes, about one centimeter in diameter were worked off and secured for insertion in grooves along the edges of bone or ivory implements and weapons. There can be no doubt, judging from these accounts, that the iron formerly in use by the Cape York or Smith Sound tribe was meteoritic in origin. Furthermore it seems highly improbable that

<sup>1</sup> *Northward over the Great Ice*, 554. New York, 1898.



these Polar Eskimo ever knew of or used the telluric native iron of Danish Greenland in making their implements. The tribe was so effectually isolated by the then practically impassable barrier of Melville Bay that its very existence was but dimly legendary among the Eskimo of southern Greenland, while the Polar people themselves thought that they were the only men in the world, prior to the arrival of Ross a century ago.

The Crocker Land Expedition secured from an Eskimo a small iron meteorite which was found near an ancient igloo site at Eskimopolis (Sverdrup's name) at the eastern end of Knud Peninsula, Ellesmere Land, in 1914. This is now in the American Museum awaiting complete description, but certain features that it shows make desirable a brief reference to it here. It is oval in shape, 9.8 cm. by 9.7 cm. by 4.6 cm. in size and it weighs 1660 grams. It has not been cut, etched, or analyzed yet, but the coarse Widmanstaetten lines shown on an etched surface prove that it is meteoric in character. The illustrations given in Fig. 33 show the opposite, nearly flat sides of the little mass, for which the name Ahk-po-hone is proposed. The artificial edges produced by hammering are clearly indicated in the figures.



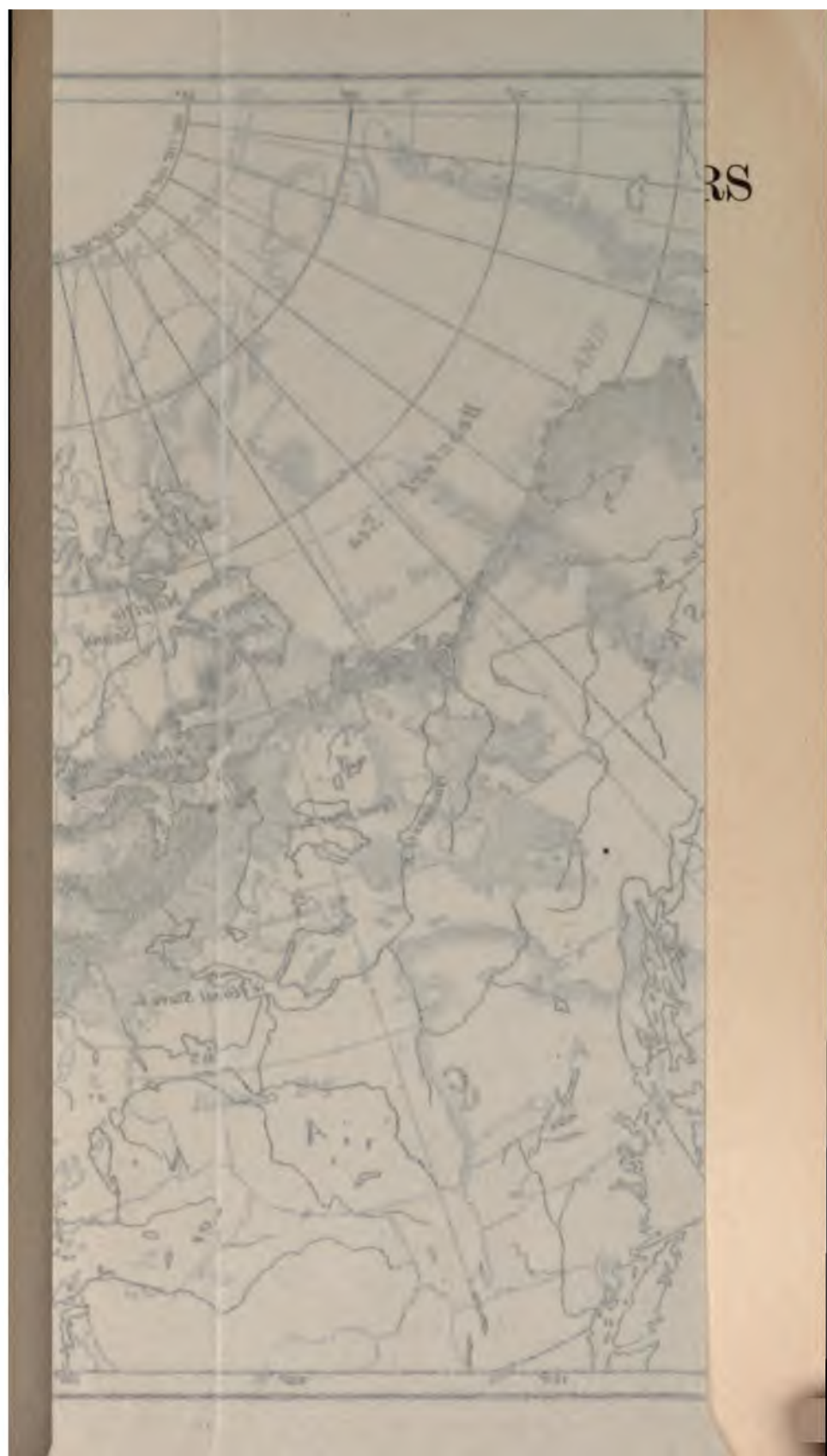
Fig. 33. Ahk-po-hone Meteorite (siderite). Eskimo Igloo Site, Knud Peninsula, Ellesmere Land. Shows effects of ancient pounding, probably for the winning of fragments for use in arming harpoon points, knives, etc. About  $\frac{1}{2}$  nat. size.

We see then that the place of iron in Eskimo culture has, if anything, been more clearly defined by the finds of Captain Comer and the investigations of the other members of the Crocker Land Expedition. The problem is one of the most important in Greenland archaeology and calls for further systematic investigation on the ground. We must look to future Danish scholars for its solution.

Aside from this, the present investigation has rather emphasized the parallels formerly observed between old Northeast Greenland sites and those of Northwest Greenland. There are also parallels with older sites at Hudson Bay and westward. Thus, it appears that the archaeological problems of Greenland have taken such definite form that their early solution may be safely predicted. This solution will go a long way in revealing the early history of the Eskimo.









**ANTHROPOLOGICAL PAPERS**  
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**THE AMERICAN MUSEUM**  
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**VOL. XXII, PART IV**

**THE TRENTON ARGILLITE CULTURE**

**BY**

**LESLIE SPIER**



**NEW YORK**  
**PUBLISHED BY ORDER OF THE TRUSTEES**  
**1918**





**THE TRENTON ARGILLITE CULTURE.**

**By LESLIE SPIER.**



## PREFACE.

The assumed antiquity of the culture deposits at Trenton, New Jersey, has been the subject of controversy for nearly fifty years. The so-called "Argillite Culture," a deposit of stone implements and bone fragments uncovered by Abbott, Putnam, and Volk in a sand layer of intermediate geological position and undetermined age, has presumably some fair claim to antiquity. The larger aspects of the deposit have been sketched by these investigators: the following report records the relations discovered by a more detailed study.

The proposed destruction of the site for railway extension led Dr. Charles C. Abbott, owner and discoverer, to invite reëxamination by this Museum. Trial trenching was begun in May, 1914, by Mr. Alanson Skinner with my assistance, and in October, 1914, Mr. Skinner made extensive excavations. During the summer of 1915, I reëxamined and extended these excavations as the stratigraphic relations dictated. Other sites suggesting similar conditions were examined from time to time from 1913 to 1915.

Thanks are due to Dr. Abbott for his courteous invitation, to Mr. Skinner for his mass of evidence, to Mr. Louis R. Sullivan for an examination of the skeletal remains, and to Dr. Chester A. Reeds for a geological examination of the site, which to our mutual regret was not extended enough to be decisive. The coöperation of Mr. Ernest Volk, Dr. Henry B. Kümmel, Prof. J. Volney Lewis, Dr. William K. Gregory and others is appreciated, as well as the assistance of Mr. B. E. Hoover in the field.

LESLIE SPIER.

October, 1918.



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Fig. 1. Map of Trenton, showing the Location of the Area of the Argillite Culture (shaded).

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heavily overloaded with rock débris and consequently aggraded their valleys. Such a deposit lies in the Delaware Valley, extending to Trenton where it merges into coeval estuarine deposits of different origin. During the later part of this stage the southern part of the state subsided to forty or fifty feet below its present level with resulting erosions and depositions. At this time (Cape May Submergence) the sixty-foot plain of gravel extending from southern Trenton northeastward along Assanpink Creek to Baker's Basin was formed. It is composed partly of glacial material from up the Delaware and partly of non-glacial material from the southeast. After the withdrawal of the Wisconsin ice sheet came a differential uplift and subsequently a slight subsidence. This change of elevation has caused the Delaware to erode its valley in the vicinity of Trenton to a depth of forty or fifty feet below the sixty-foot gravel plain, thus forming the existing physiographic relations of bluff and terrace. Post-glacial conditions have brought minor superficial changes, such as the deposition of the stratum or perhaps strata of yellow sand which caps the mixed gravels.

From the broader geological viewpoint this sand forms an integral part of the glacial and post-glacial gravels descriptively referred to as the Cape May formation. It cannot be too strongly emphasized that these recent sands and gravels are avowedly of heterogeneous origin and can only be classed together from the angle of geologic history as a whole. From an archaeological viewpoint a distinction has been drawn between them; by some authorities the gravels have been associated with one prehistoric culture, the sand with another.<sup>1</sup>

Broadly speaking then a trench sunk into the terrace at any point from the Abbott farm northward discloses three strata which the archaeologist has seen fit to recognize as distinct, while knowing that the geologist has not sufficient criteria to discriminate between them. The present surface soil is a black humus six inches or more deep; below this is a stratum of yellow sand from one to six feet deep resting on stratified gravels extending at least to the flood plain of the Delaware.

The black soil is the upper surface of the stratum of yellow sand discolored by decayed organic matter. The surface is under cultivation and repeated plowing has produced a uniform mixture of organic material and discolored sand. It seems clear that the sharply marked plane of contact of black and yellow soils is simply the plow-line. Minor erosive and aeolian changes have given the black soil a differential depth from a few inches to several feet, but it is fairly uniform at about six inches.

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<sup>1</sup> This description has been drawn largely from the convenient summary by Lewis and Kummel and from the Geologic Atlas, Bascom.

The yellow sand ("yellow drift") varies in thickness from one to six feet and more. It is loose, relatively structureless, and varies locally in coarseness, the gravel constituent gradually becoming more noticeable two or three miles from the river northeast of south Trenton. In the vicinity of the escarpment the sand is relatively free from gravel, but encloses pebbles from the size of peas to boulders of three and four feet diameter. The pebbles and boulders vary in character and position in the sand: the distribution of some will be discussed later. The sand is traversed by red layers or films (the "red bands" as seen in section), composed of clay, iron, and sand, which appear at frequent intervals from a few inches below the surface down. They extend throughout the deposit from the south end of Trenton to the Abbott farm. As seen in section they appear as irregular, wavy bands, usually four to six inches apart, thin near the surface but increasing in thickness with the increase in depth. The sand deposit has been ascribed variously to aeolian and fluvial origins, the red bands to fluvial origins or as marking ancient surfaces.<sup>1</sup>

Within the last fifty years archaeologists have alleged three cultures associated with the three strata, black soil, yellow drift, and gravels. The black soil contains the relics of historic Indians, the Delaware and perhaps others. Below this the yellow sand was believed to contain a ruder culture, chipped blades and hammerstones, but no pottery or finer stonework. Chipped pebbles taken from the gravels or associated with them have been styled "palaeolithic" and assigned a great antiquity.

In this paper we are concerned with the alleged culture of the yellow sand, the so-called "argillite culture."

#### PREVIOUS WORK.

The work of earlier investigators extends over a period of fifty years. The literature is voluminous and in part irrelevant. The ideas presented concerning the "argillite culture" are obscured by the evidence adduced for a still earlier "paleolithic" culture. Since we are not concerned here with that evidence, it will be necessary to point out those facts brought forward which bear strictly on the "argillite culture."

The earlier stages in the development of the problem were almost entirely the work of Dr. Charles C. Abbott. As early as 1872 he found near Trenton crude implements associated with remains of the historic Delaware Indians.

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<sup>1</sup> Kummel; Salisbury; Wright; etc. For further details of the sand see Volk, (b), 1-13.

When later similar crude specimens were found at various depths in the underlying gravels in the vicinity, his inference was that these were the remains of a paleolithic culture. This had flourished on the spot while the gravel terraces were forming and in some instances had become accidentally associated with the remains of the historic culture. We get our first hint, however, that there may be a third or intermediate culture in his "Primitive Industry" (1881). Our attention is called to the predominance of argillite over flints deep in the soil when compared with surface finds. It is suggested that these finds may be examples of a link between the paleolithic remains and those of the historic Indians.<sup>1</sup> More than ten years (1883) after his first finds, Dr. Abbott crystallized his conception of a third culture intermediate in geological position and cultural type. This comprises the group of implements, made wholly or largely of argillite, lying in the stratum of sand capping the gravels in which the paleolithic finds occur and underlying the surface soil containing Delaware relics.

....Below the base of this deposit of [black] soil, at an average depth of about two feet, the *argillite* implements occur in greatest abundance.<sup>2</sup>

This third culture is not isolated nor is it intermediate and transitional between paleolithic and Indian cultures: it is the lineal descendant of the paleolithic, but not the ancestor of the Indian culture.<sup>3</sup> It is conceived that the argillite culture did not develop in the area occupied by the yellow sand, but rather on the high ground bordering the small streams in the vicinity at a time when their normal water burden was at the present freshet stage, and that the implements were subsequently washed into the position in which they were found.<sup>4</sup> Later, however, (1908) Abbott changed his conception of the cultural leanings of these finds, their similarity to Delaware remains suggesting that they gradually merged into the historic types.<sup>5</sup>

Much of the irrelevance of subsequent discussion must be laid to the lack of clearness and precision in Abbott's presentation.

In his discussion of the general situation, Holmes (1893), is properly critical of the proofs for the existence of a paleolithic culture and a culture of the glacial epoch but he fails to note Abbott's discrimination among the supposed pre-Delaware finds.<sup>6</sup> Subsequently he dismisses the argillite

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<sup>1</sup> Abbott, (d), 467, 276, 515 and 517.

<sup>2</sup> Abbott, (e), 318 and 321.

<sup>3</sup> Abbott, (f), 21 *et seq.*

<sup>4</sup> Abbott, (g), 147 *et seq.*

<sup>5</sup> Abbott, (i), II, 29.

<sup>6</sup> Holmes, (a), (b).

culture rather cavalierly, contending that these implements represent an arbitrarily selected series from historic Indian remains and failing to note that Abbott's attention was directed to them by their association with the yellow sand.<sup>1</sup> In 1897 Holmes assumed a more compromising position. The three reputed cultures are not such, but by assigning some historical relief to the Delaware occupation may be explained in the following way. The first Delaware utilized for their implements the only available material, the argillite boulders at Trenton, and left behind on the spot the quarry refuse, the supposed paleoliths: later as they spread and explored the upland, flint and jasper became available. Yet Holmes seems to indicate that this explanation is inadequate, since he expresses his intention to treat subsequently of the superficial sand deposits.<sup>2</sup> I am unable to find any further discussion of the point.

At the same time (1897) Putnam contributed a significant statement.

If you will dig a trench anywhere in that region [Lalor Field], you will find many more implements of this character [objects of the argillite culture] in the upper bed of sand than in the black soil; you will find that they are most abundant just at the border line of the black soil and the sand.<sup>3</sup>

This observation, like Abbott's noted above, was not valued at its true worth.

Mercer's contribution to the subject (1897) is to the point. Concerned only with the alleged culture in the yellow sand, he concludes as the result of his own excavations that implements of argillite, jasper, and chert occur *in situ* in the sand, that there is no marked difference from surface finds in the kind of material used, their patina, or mode of fracture, but that animal bones and pottery are absent. His remarks on the position of the artifacts are interesting: —

[Stone chips and fractured pebbles] showed thickest under the latter [the black soil], growing thinner downward. . . . The artifacts were scattered at irregular depths in the sand, nowhere suggesting by their collocation a floor of occupancy or workshop abandoned by primitive man.

While he recognized that all his finds were made in a "shallow zone of discovery, ceasing at about three feet below the surface," yet his statement concerning their frequency of occurrence is incorrect, as I shall show later on the basis of his concrete data. Nevertheless, Mercer's must be recognized as the first precise account of the argillite culture.<sup>4</sup>

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<sup>1</sup> Holmes, (c), 30 *et seq.*

<sup>2</sup> Holmes, (d), 365-366.

<sup>3</sup> Putnam, (g), 346.

<sup>4</sup> Mercer, (c).

Systematic explorations in the Trenton district began in 1889 when Mr. Ernest Volk started operations. In 1893<sup>1</sup> he found that the following conditions held for the argillite culture: both on the terrace and on the meadow at river level he found argillite flakes, alone except for quartzite pebbles, at the junction of the black soil with the yellow sand "and sometimes two or three inches in the yellow deposit." Further evidence seemed to indicate a progressive technical development, with the use of new materials, at higher points in the black soil. Volk's report of 1911 gives the results of his twenty years labor in full and in fairly definite form. He finds a progressive complexity and technical perfection in the historic Indian remains in the black soil on the terrace and lowland.<sup>2</sup> The argillite culture in the yellow drift had the following characteristics: —

1. The numerous artifacts were scattered in isolation or were grouped through several square miles of the yellow drift; these groups are called "pits" and "workshops" evidently because Volk believed the artificers lived on the drift during the process of its deposition.

2. The implements are of five types, spear head, arrow head, an implement with a jagged cutting edge, a drill-like specimen, and hammerstone. Their material is argillite, quartzite, and chert. Fire-fractured pebbles also occur, but nothing else.

3. The red bands are of fluvial origin and indicate a similar origin for the greater part of the yellow drift.<sup>3</sup>

Volk's attention centered on the deepest specimens with disproportionate neglect for the distribution of the majority. This attitude was seemingly dictated in part by a desire to rule out all finds which might possibly be intrusive from the surface soil. Traces of man in the gravels give Volk corroboration of a third culture. This need not concern us here. Volk's contributions are invaluable, for he showed that the artifacts are numerous, occur over a wide area, and are of a type distinct from the Delaware remains, but he neglected to make the fullest use of his data.

#### EXCAVATIONS.

Our operations were begun at Dr. Abbott's invitation at his farm on the terrace. This is at the extreme southern end of the area over which Mr. Volk found the argillite culture. The point we selected for trenching lies in a short tongue of yellow sand, mapped as "Cape May formation" on the U. S. G. S. Trenton map, extending south into the Pensauken formation

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<sup>1</sup> Volk, (a).

<sup>2</sup> Volk, (b), 55, 71.

<sup>3</sup> *Ibid.*, 103-109, 125.

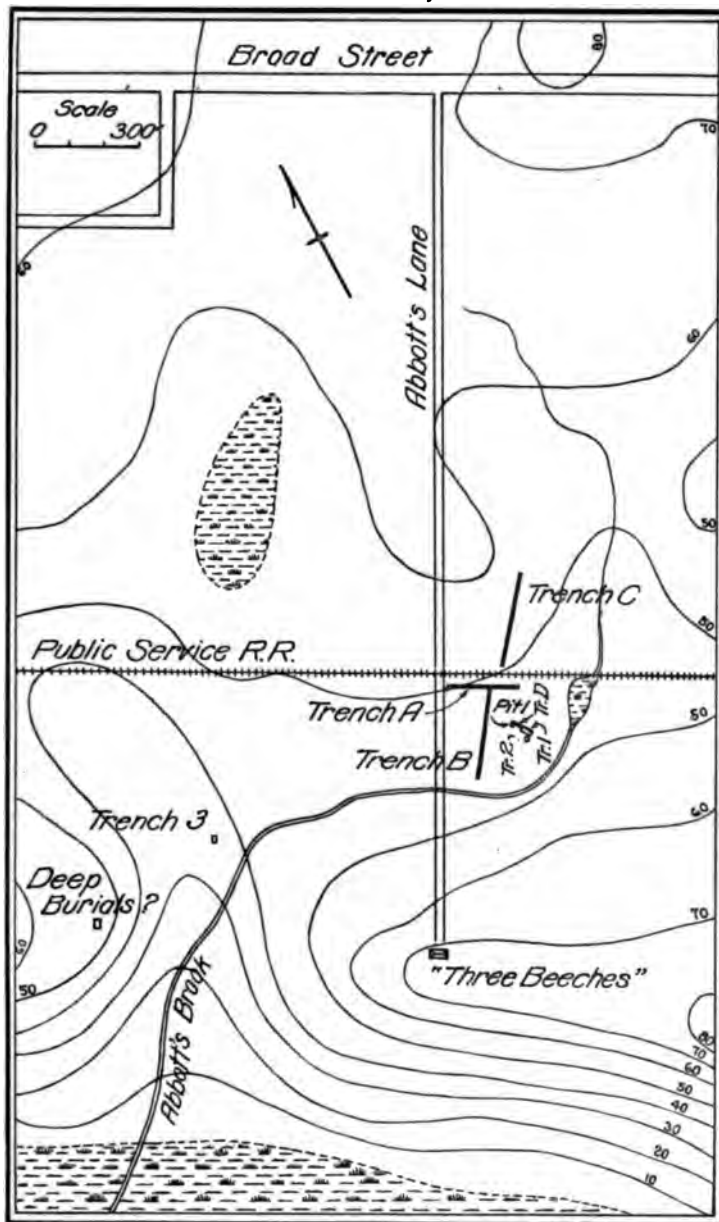


Fig. 2. Map of Abbott's Farm, showing the Position of the Trenches.

back from the bluff. Advancing eastward from the bluff on the line of Abbott's Lane, we have first a high Pensauken terrace on which the homestead stood, sloping east to a little brook 500 feet from the bluff. From the brook the yellow sand, covered, of course, by black soil, slopes gently up for 330 feet to the Trenton-Camden trolley and then slopes very gradually upward for about 1650 feet to Broad Street where the Pensauken deposit is reached again. The trenches, with one exception, lie on both sides of the trolley line between Abbott's Lane on the north and the Pensauken deposit on the south (Fig. 2).

In May, 1914, Mr. Alanson Skinner and I opened three small trenches and a pit as follows: Trench 1, 8 ft. wide by 30 ft.; Trench 2, 5 ft. wide by 8 ft.; Trench 3, 7 ft. wide by 10 ft.; all trenches 4 ft. deep, i. e., the full depth of the yellow sand; Pit 1, 7 ft. by 8 ft. by 6.5 ft. deep. The surface soil was entirely removed; then trenching proceeded by scraping the breast or forward face of the trench with a trowel. The depth below the plane of contact of black and yellow soils (now the surface) and the lateral position of each specimen was noted before it was removed.

This sample trenching corroborating Volk's findings, Mr. Skinner commenced (October, 1914) extensive excavations. Three trenches were dug, one parallel to the trolley tracks (A), the others cross-sectioning the hillside (B and C). Trench A was 206 ft. long by 8.5 ft., Trench B, 150 ft. long by 3 ft., and Trench C, 190 ft. by 2.5 ft. These were excavated in levels, a foot at a time, and the sand sifted. The uppermost level, 2 ft. deep in Trench A and 1 ft. in Trenches B and C, including both black soil and yellow was arbitrarily segregated as being within a "zone of doubt." Trench A was excavated throughout to a depth of 3 ft., for half its length to 5 ft., and in the middle a pit was carried down to ground-water level at 12.5 ft. Trench B, extending down hill, was excavated in a series of steps with 1 ft. lifts to maintain a constant minimum depth of 4 ft. Trench C, on the level, was excavated to a depth of 2 ft. This trenching resulted in a large number of specimens whose distribution was similar to that in Trenches 1, 2, and 3.

I now found that tabulating the recorded positions of specimens from Trenches 1 and 2 gave a characteristic distribution curve which also held for Volk's and Mercer's finds in Lalor field. The gross distribution of the specimens from Trenches A, B, and C also agreed. To test this result Trenches B and C were reopened and the slope further cross-sectioned by deepening them to a depth of 1 ft. below the artifact-bearing zone, and by extending the trenches for the full distance down the slopes. The neat line of these excavations is shown on the profile of Trenches B and C (Fig. 3). The sand from the trenches was sifted a shovelful at a time and depths of

specimens below the plane of contact immediately recorded. The greatest error in these records due to the screening method is 2 inches. Other artifact curves were obtained by troweling sections along the line of trench. In all four hundred specimens were found. At the suggestion of Dr. Chester A. Reeds the location of pebbles was recorded. Troweled sections similar to those used to obtain artifact curves and yielding pebble curves were dug as close to the artifact sections as possible. The red bands traversing the yellow soil were carefully mapped.



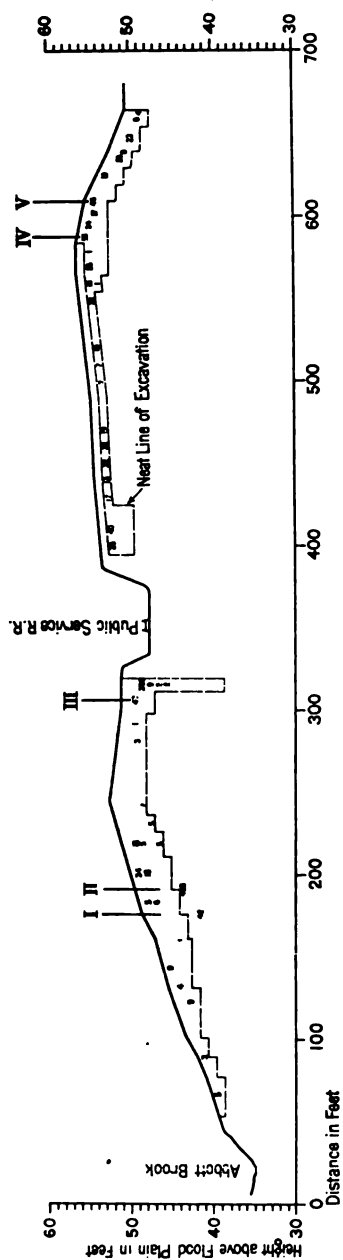
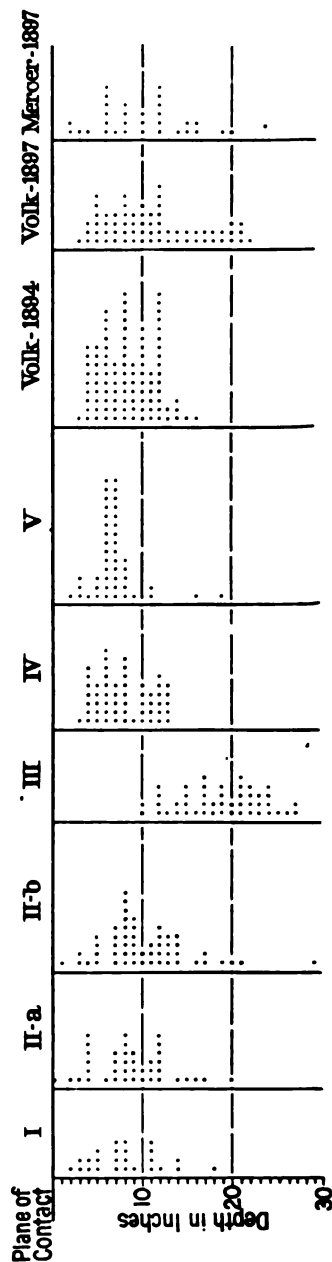


Fig. 3. Profile of Trenches B and C, looking north.



## STRATIGRAPHIC RELATIONS.

The area of yellow sand from which objects of the argillite culture have been taken is not large (Fig. 1). Volk's excavations define it as beginning, "at the so-called Riverview Cemetery at the south end of Trenton, where the bank strikes the Delaware River, along the top of the terrace directly east and then southeast following its windings and finally south altogether to the little stream which runs through Dr. Abbott's farm; a strip of land about three [?] miles in length and about three to four hundred feet or more in width,"<sup>1</sup> to which our excavations add a few hundred feet at the south end. While the area specified is a narrow strip along the escarpment of the terrace, I am not certain that objects have not been found further back from the bluff. Mr. Volk is not clear as to whether he has not found objects inland or whether he carried on no systematic excavations there. On the Abbott farm, where the Museum party operated, artifacts were found as far as 1430 feet from the bluff.

The distribution of the specimens within the yellow soil shows a suggestive arrangement. The bulk of the specimens lie in a plane located from six inches to a foot below the black soil. I have indicated on the profile of Trenches B and C, (Fig. 3), the distribution of all the specimens by figures representing the number of specimens found near the position occupied by each figure. Beginning at the western end, it will be noted that only isolated specimens were found in the first 180 feet, east of this the mass of the specimens lie in a single plane at a grade of 1.5 percent to 2.0 percent for the first 400 feet, and roughly parallel to the surface for the remaining distance. This plane lies from 12 to 18 inches below the surface. To these data we must add that of the work of 1914 in Trenches 1, 2, and 3, which is in entire agreement. Trenches 1 and 2 lie beyond the crest of the slope and therefore not in the plane of the profile, but they are, nevertheless, indicated at II and I, respectively. As indicated in the profile, distribution in this plane is not uniform. The objects occur in groups, the lateral distribution of which is of normal frequency or accidental type.<sup>2</sup>

The vertical arrangement of these groups is given by the following series. I have tabulated the number of specimens for each inch of depth for groups I-V on the profile and from Trench 3. Comparable data by Volk and Mercer from Lalor field (more than a mile north) are also given. Mercer's data are recorded depths of individual specimens from several trenches;<sup>3</sup>

<sup>1</sup> Personal communication.

<sup>2</sup> Spier, (c), 183-185.

<sup>3</sup> Mercer, (c).

Volk's chart series was checked from a chart in the Museum,<sup>1</sup> and his 1894 and 1897 series represent the frequency of positions mentioned in his report, not the number of specimens.<sup>2</sup>

Depth Below Plane of Contact. (Inches)	Frequencies										
	I	Ia Arti- facts	Ib Bone	III	IV	V	Trench 3	Mercer 1897	Volk Chart	Volk 1894	Volk 1897
0	..	1	..	..	..	..	..	..	..	..	..
1	..	..	1	..	..	..	..	..	..	..	..
2	1	1	..	..	..	1	..	2	..	..	..
3	2	1	2	..	1	3	3	1	1	1	1
4	2	6	1	..	7	1	2	1	2	9	3
5	3	..	4	..	5	3	2	..	2	9	6
6	..	1	..	..	9	14	3	6	5	13	4
7	4	4	5	..	5	14	2	1	6	7	4
8	4	6	9	..	8	5	2	4	3	15	6
9	1	4	6	..	1	1	3	..	1	7	4
10	..	2	2	2	5	..	..	3	1	11	5
11	4	3	3	..	4	2	1	..	..	6	4
12	1	6	5	4	6	..	..	6	..	15	7
13	..	..	4	1	4	..	..	..	3	2	2
14	2	1	4	2	..	..	..	1	1	3	2
15	..	1	..	4	..	..	..	2	..	1	2
16	..	1	1	1	..	1	..	2	..	1	2
17	..	1	2	5	..	..	..	..	..	..	2
18	1	..	..	2	..	..	..	..	..	..	2
19	..	..	1	4	..	1	1	1	1	..	2
20	..	1	1	2	..	..	1	1	..	..	3
21	..	..	1	5	..	..	..	..	..	..	3
22	..	..	..	4	..	..	..	..	..	..	1
23	..	..	..	3	..	..	..	..	..	..	..
24	..	2	..	4	..	..	..	..	..	..	..
25	..	..	..	1	..	..	..	..	..	..	..
26	..	..	..	1	..	..	..	..	..	..	..
27	..	..	..	2	..	..	..	..	..	..	..
28	..	..	..	..	..	..	..	..	..	..	..
29	..	..	1	..	..	..	..	..	..	..	..

Some of these series are shown graphically in Fig. 4. The following gross distributions are in accord. The series from Trench A results from

<sup>1</sup> Volk, (b), 90.

<sup>2</sup> *Ibid.*, 85 *et seq.*

Skinner's excavation by levels, the upper twelve inches or so of yellow soil having been discarded (see above); the other two are the roughly recorded occurrences from Trenches B and C, other than the series given above.

Depth Below Surface. (Feet)	Trench A	Depth Below Plane of Contact. (Inches)	Trench B	Trench C
2-3	286	0-6	13	27
3-4	9	6-12	43	86
4-5	2	12-18	29	45
5-6	2	18-24	29	15
		24-30	6	20
		30-36	3	2
		36-42	8	
		42-48	10	
		48-54	2	

An inspection of the detailed series shows their similarity in range and manner of dispersion. The ranges are similar, varying from 11 to 29 inches. In each series the position of maximum frequency is at the middle of the range, and the distribution is symmetrical about this point with the frequency of occurrence progressively less from the center to the extremes of the range. We recognize the close resemblance, if not identity, between the form of distribution common to these eleven series and the typical frequency curve.

The following averages and variabilities have been calculated for the above series.<sup>1</sup>

Series	Number of Cases	Average	Variability
I. ....	25	8.1	$\pm 3.80$
IIa. ....	42	9.9	$\pm 4.35$
IIb. ....	53	10.2	$\pm 4.67$
III. ....	47	18.8	$\pm 4.84$
IV. ....	55	8.0	$\pm 3.21$
V. ....	46	7.0	$\pm 2.88$
Trench 3	20	7.6	$\pm 4.66$
Mercer-1897	31	9.8	$\pm 4.87$
Volk-Chart	26	8.0	$\pm 3.68$
1894	109	7.8	$\pm 2.87$
1897	65	11.2	$\pm 5.22$

<sup>1</sup> I follow Wissler, (a), in the statistical treatment.

With the exception of III the averages are similar. There are no artifacts in the first 9 inches of this series; if this is deducted, the average is 9.8. The maximum difference between any two series is 4.2 (V and Volk — 1897) and the certainty of this is  $\pm 0.77$ . This approaches a real difference, but it is the extreme case. As a further but not altogether accurate test we find, assuming the series to be homologous, the average for all series combined to be  $8.9 \pm 3.57$  (correcting III) and the error of this average is  $0.16 \pm 0.11$ . The extreme averages differ from this by 1.9 and 2.3. These are, therefore, within the range of variation of the general average. The series are probably more strictly homogeneous, since the values are not rigorous but include as variables: —

1. Measurement from the planes of contact of the black and yellow soils; this being a warped plane, it introduces a small error in the observations;
2. A possible change in the plane of maximum frequency, as indicated in III, probably due to a subsequent change in the superficial deposits;
3. Observations grouped from several trenches in one series, as Mercer, 1897, and Volk, 1894 and 1897;
4. Values dependent on the frequency of positions mentioned, not on actual count of all recorded positions.

If deduction be made for these variables we have still less reason to believe the series independent. These series are, therefore, homogeneous; that is, they are samples of a single series. The vertical distribution of the groups is such as to conclude that a single cause of deposition has acted on all, giving a single plane of maximum deposition throughout the deposit.

It is of interest to note that previous investigators obtained evidence in agreement with the above, the significance of which they failed to note; viz., Abbott found implements in greatest abundance at a depth of about two feet,<sup>1</sup> or again, in greatest abundance at the "base" of the deposit of black soil;<sup>2</sup> Kümmel noted that they occur within less than four feet of the surface;<sup>3</sup> Putnam generalizes that they are most abundant "just at the border line of the black soil and the [yellow] sand";<sup>4</sup> Wright notes their occurrence from fifteen to thirty-five inches below the surface;<sup>5</sup> and Mercer found a "shallow zone of discovery, ceasing at about three feet below the surface."<sup>6</sup>

It must now be obvious that the objection often expressed that these objects are intrusive from the black soil will no longer hold; this aside from their cultural distinctness. If they had been let down from the black soil into the yellow, we would find the maximum frequency at the plane of con-

<sup>1</sup> Abbott, (a), 318.

<sup>2</sup> Abbott, (f), 313.

<sup>3</sup> Kümmel, 348.

<sup>4</sup> Putnam, (g), 346.

<sup>5</sup> Wright, 357.

<sup>6</sup> Mercer, (c), 377.

tact with frequencies diminishing with depth. This is not so; there is a distinct gap between the distribution of artifacts in the surface soil and those below.

A few of Volk's finds have been interpreted at variance with these results. His "workshops"<sup>1</sup> in the yellow soil seem to be nothing but normal artifact groups. Four "fireplaces" and "pits" showed disturbed soil, broken red bands, "burnt" soil, or "charcoal."<sup>2</sup> I would suggest that the identification of these was an error. In connection with groups of artifacts, discolored strata of sand and colored clay fragments may easily be mistaken for traces of fire. The deep "burials" of human bones on the Abbott farm (three groups, 4 feet to 4 feet 6 inches below the black soil) are below the plane of maximum frequency for artifacts. They were found, however, at the extreme edge of the deposit, close to Abbott's brook which has cut a deep gully along the boundary between the sand deposit and the Pensauken terrace. There is just a possibility that the yellow sand has been worked over and redeposited by the brook, at which time the remains were either moved within the deposit or introduced from elsewhere.

Let us now consider the relation of artifacts to other features of the yellow sand, namely the pebbles and the red bands.

Artifacts occur among the pebbles in the sand and are found in general only with the pebbles. This does not mean that artifacts are found at every point where pebbles lie, nor that pebbles are always associated with artifact groups, but the association occurs with great frequency. The gross relations are given in the table on p. 188 which shows the vertical ranges of pebbles and artifacts at various points in the trenches. Thus, at least ten of the sixteen cases where pebbles and artifacts were noted at the same points show that they have identical vertical ranges, or the range of the artifacts is included in that of the pebbles.

To determine the distribution of the pebbles more exactly and their relation to that of the artifacts, series were obtained at III and V on the profile (Fig. 3). These series were taken from sections of sand in the trench wall as near as possible (within a foot or so) to the corresponding artifact series.<sup>3</sup>

Tabulating the number of pebbles in each inch of depth below the plane of contact, and comparing corresponding data for the artifacts, I obtained the series on p. 189. These series are shown graphically in Fig. 5. The proportion of artifacts to pebbles has no significance, since the series were taken from adjacent sections, and these sections differed in size.

<sup>1</sup> Volk, (b), 87 — Oct. 17, 88 — May 20 and 23, 89 — July 30.

<sup>2</sup> *Ibid.*, 85 — April 26, 87 — Oct. 24, 89 — Aug. 6, 98 — July 25.

<sup>3</sup> These sections were 4 feet long by 6 inches wide for III and 1 foot wide for V, with depth to grade.

# GROSS AND SERIAL DISTRIBUTION OF PEBBLES AND ARTIFACTS.

Position on Horizontal Scale of Profile (Fig. 3)	Depth of Pebbles Below Plane of Contact (inches)	Depth of Artifacts Be Plane of Contact (inches)
53-101	No pebbles	6
101-146	Pebbles sparsely scattered through yellow sand, with groups as below.	
102	0-6 — group	6
115	0-12 — “	6-16
130	6-21 — “	6-20
145	17-41 (extreme limits) — group	5-39
155	20-32	24
168	20-32	21
196	34-42	6-45
211	32-44	12-41
235	46-grade — many pebbles	14-38
264	39-44; 47-grade — very many tiny pebbles in brown sand	
271	36-48 — very many	
271-311	5-38 — many	10-27
315	18-36 — many	12-66
398	26-48	6-18 (?)
409	33-46	6-18 “
416	34-48	6-18 “
584-594	0-24 — scattered tiny pebbles	3-13
596	0-20	0-23

Depth Below Plane of Contact (inches)	Frequency			
	III		V	
	Artifacts	Pebbles	Artifacts	Pebbles
0	..	2	..	..
1	..	4	..	4
2	..	4	1	6
3	..	4	3	3
4	..	1	1	10
5	..	2	3	16
6	..	5	14	20
7	..	5	14	20
8	..	3	5	22
9	..	5	1	18
10	2	9	..	14
11	..	5	2	10
12	4	9	..	8
13	1	8	..	10
14	2	9	..	12
15	4	17	..	2
16	1	21	1	6
17	5	32	..	4
18	2	32	..	2
19	4	32	..	..
20	2	41	..	2
21	5	30	..	2
22	4	40	..	1
23	3	33	..	..
24	4	33	..	1
25	1	24	..	..
26	1	24	..	..
27	2	23	..	1
28	..	20	..	..
29	..	31*	..	..
30	..	40	..	..
31	..	34	..	..
32	..	30	..	..
33	..	21	..	..
34	..	14	..	..
35	..	13	..	..
36	..	9	..	..
37	..	7	..	..
38	..	1	..	..
39	..	1	..	..
40	..	1	..	..
41	..	1	..	..

\* Change of observers.



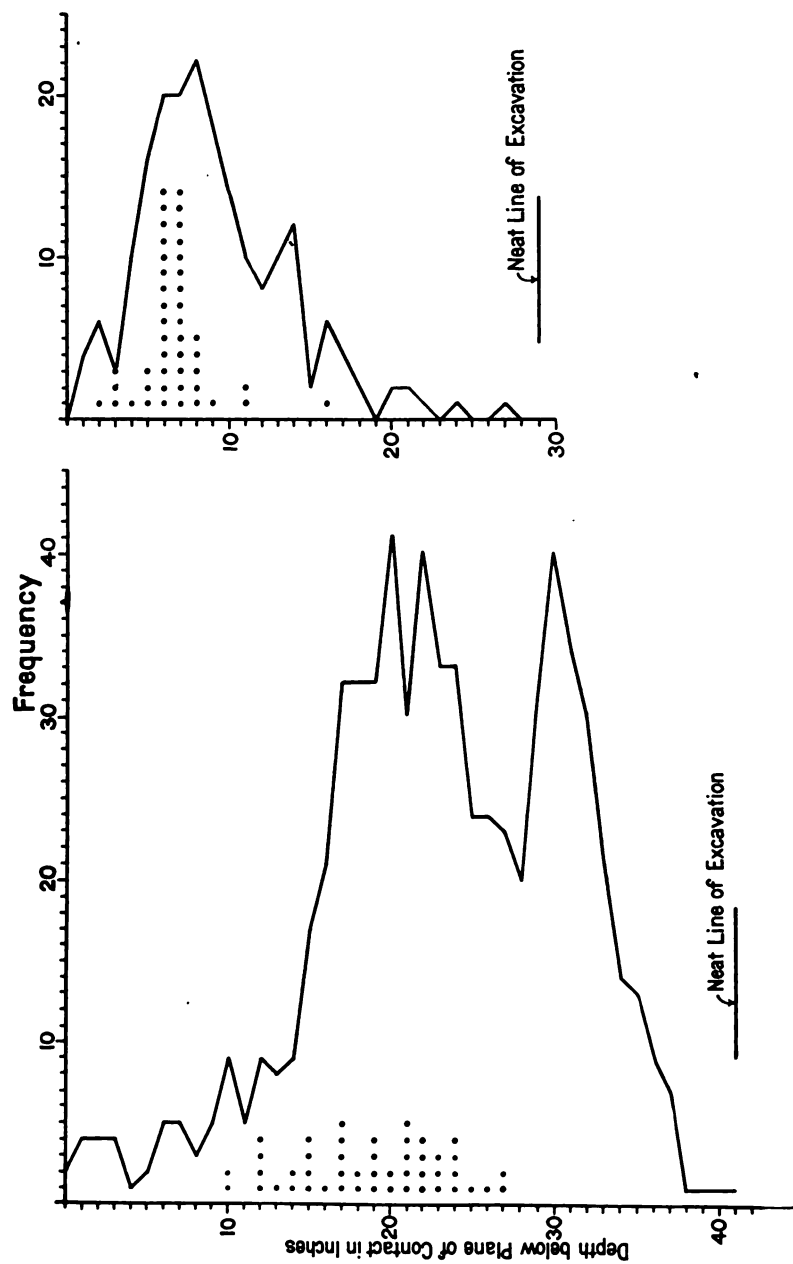


FIG. 5. Vertical Distribution of Artifacts and Pebbles of Groups III and V: Artifacts.....; Pebbles....

An inspection of the two pebble series shows their similarity and their close resemblance to the typical frequency curve. On comparing each with the corresponding artifact series, we note that the modal points occur at about the same depth, that the manner of distribution is identical, and that the range of dispersion of the artifact series, if not identical with that of the pebbles, falls within it.

In calculating averages and variabilities for these series, it must be noted that III was obtained by two observers; by Mr. Hoover from 0 to 29 inches, by myself from 29 to 41 inches (at grade), the change occurring during the excavation of the twenty-ninth inch. I have apparently doubled the count. Both segments of the curve are apparently fragments of normally variable series with approximately the same ranges and modes, but differing in the total number of cases. An average for the two segments combined would obviously give too high a value, since my higher count is added to one end of the range alone. It seems permissible to use Hoover's segment alone.

Comparative data are obtained from Mercer's record<sup>1</sup> for Lalor field.<sup>2</sup>

Series	Pebbles			Artifacts		
	Number	Average	Variability	Number	Average	Variability
III— Hoover and Spier	675	23.3	$\pm 7.55$	47	18.8	$\pm 4.84$
Hoover <sup>2</sup>	477	21.2	$\pm 3.8$			
V	194	9.1	$\pm 4.37$	46	7.0	$\pm 2.88$
Mercer	56	11.7	$\pm 5.96$	31	9.8	$\pm 4.87$

In III the combined Hoover-Spier series differs from the corresponding artifact series by  $4.5 \pm 0.77$ . This is a certain difference. The difference with the Hoover series is roughly  $2.4 \pm 0.7$ . This, on the other hand, is not a certain difference. The difference for V is  $2.1 \pm 0.53$ , which approaches a real difference but is not certain. For Mercer's series, the difference is  $1.9 \pm 1.20$ , indicating the certain identity of the series. The series of bone fragments (II b) presents a comparable phenomenon; its average is  $10.2 \pm 4.67$  and that of the artifact series (II a) is  $9.9 \pm 4.35$ , which with a difference of  $0.3 \pm 0.94$  are certainly identical. These are

<sup>1</sup> Mercer, (c), 374-375. Mercer's pebble series is for the largest pebbles only, and particularly for those in the vicinity of 20 inches, i. e., near the only artifact in which he was interested. This grouping of observations about 20 inches gives a higher value for the average of the series than we need expect.

<sup>2</sup> This approximate average and variability were obtained by inspection. Accurate values could be obtained by Pearson's method of curve fitting (*Biometrika*, II, 1, 1902) but the data do not warrant the labor involved.

fragments of two human skeletons all found within a radius of three feet; it necessarily follows that the entire series was deposited at one time.

These data must be interpreted as indicating that the artifact series are identical with the pebble series, that is, both are components of the same series. This can only mean that a single cause of deposition has acted on artifacts and pebbles alike.

As Dr. Wissler observes: —

While all the preceding leaves little ground for differentiating between the pebble and artifact series, it may be noted that in each of the three cases the average for pebbles is actually higher than that for artifacts. Should this hold for a few future cases, it would make it quite probable that there was a slight real difference between the two series. Yet this would not materially affect the main point, that the artifacts and pebbles occur together.<sup>1</sup>

It is, perhaps, significant that the difference in all three cases is approximately the same: 2.4, 2.1, and 1.9. Consonant with this is the approximation of all the variabilities, which would indicate that artifact and pebble series stand somewhat apart. On the other hand, the difference may have no significance whatever. Artifact and pebble series, as tabulated above, have approximately the same modal points; the artifact series is symmetrical but the pebble series is asymmetrical. If of two series which are identical and symmetrical, the number of cases in one be greater than the other, then according to the law of probability the range of the first series would be greater than the second. If further in this series cases at the lower end of the range were systematically eliminated (i. e., if one end of the curve is cut off), then this curve would be asymmetrical and its average would have a higher value than that of the curve with fewer cases. *In the nature of the case*, this is exactly what has happened to our pebble series, merely because it contains a larger number of cases (except Mercer's series<sup>2</sup>) than the artifact series, the additional cases appearing at the greatest depths more frequently than at the least. In fact when we do obtain an artifact series with a large number of cases we find asymmetry of the same type: for example, Trench A gave for the first foot, x specimens; second, 286; third, 9; fourth, 2; and fifth, 2. Any deduction from the observed differences because of this relation would give less reason for believing the series to be different.

All of these series have been discussed throughout as though they were true samples of a normally variable series. To be sure inspection of the

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<sup>1</sup> Wissler, (a), 194.

<sup>2</sup> Compare footnote, p. 191. Here we have reason to believe that but for selection the actual difference would be less than that observed.

series, in spite of the small number of observations available, shows their fairly close approximation to this form. However, we can advance no *a priori* reason why artifacts and pebbles should be distributed through the deposit in such a manner. We might reasonably expect that their distribution is actually asymmetrical and perhaps composite. It is of interest to test a series of all artifact observations combined for asymmetry. In the following table the averages for the component series have been equated and the values tabulated as variations from the average.

Deviation from Average (inches)	Observed Frequency	Cases per 1000	Theoretical Frequency	Differences	
10	1	1.9	7.1		- 5.2
9	1	1.9	11.5		- 9.6
8	6	11.7	18.4		- 6.7
7	7	13.6	28.3		- 4.7
6	19	36.8	39.5		- 2.7
5	18	35.0	53.6		-18.6
4	38	73.9	67.9	6.0	
3	47	91.2	79.9	11.3	
2	57	110.8	90.2	20.6	
1	58	112.6	96.0	16.6	
0	58	112.6	96.0	16.6	
1	35	68.0	90.2		-22.2
2	40	77.6	79.9		- 2.3
3	27	52.4	67.9		-15.5
4	35	68.0	53.6	14.4	
5	18	35.0	39.5		- 4.5
6	16	31.1	28.3	2.8	
7	7	13.6	18.4		- 4.8
8	4	7.8	11.5		- 3.7
9	8	15.5	7.1	8.4	
10	7	13.6	3.8	9.8	
11	3	5.8	2.0	3.8	
12	2	3.9	1.0	2.9	
13	..	....	0.5		- 0.5
14	2	3.9	0.2	3.7	
15	..	....	0.1		- 0.1
16	..	....	0.03		- 0.03
17	..	....	0.01		- 0.01
18	..	....	0.01		- 0.01
19	1	1.9	0.001	1.9	
Totals	515	1000.1	2(500.051)	118.8	-101.15

There is no certain evidence of asymmetry here, although this might be interpreted as indicating a moderate asymmetry similar to that of the pebble series and probably due to the same causes. While the test is not perfect, I do not believe that this is sufficient reason for regarding the series as other than normally variable. To a certain extent this emphasizes the slight difference between the artifact and pebble series. The data for the pebbles will not permit a similar inquiry into the character of its distribution.

So much for the distribution of the series as a whole: the data must next be examined for differential modes of occurrence.

Most of the artifacts, chips, arrow-heads and blades, are flat. Wherever possible their obliquity to the horizontal was noted. With only two exceptions the artifacts lay with their long diameters horizontal or nearly so. This conforms with Kümmel's experience in Lalor field.<sup>1</sup>

The yellow sand is relatively free from pebbles: these, including artifacts, are not large. They vary in size up to small boulders, the largest of which ( $10 \times 5 \times 5$  inches) was found lying flat 18 to 24 inches below the black soil at the extreme eastern end of Trench C. At the eastern end of Trench B the pebbles were chiefly  $\frac{1}{4}$  to  $\frac{3}{8}$  inch diameter; at the eastern end of Trench C  $\frac{1}{4}$  to 2 inches diameter, most frequently  $\frac{1}{2}$  inch diameter. No artifact (i. e., selected pebble) is larger than the largest boulder, and the rarity of large artifacts and large boulders is strictly comparable.

I have investigated artifact and pebble series for a differential distribution of weights of objects with positive results. The table on the next page gives the total weight of artifacts at each inch of depth for the series I-V and Trench 3.<sup>2</sup>

These give the following average depths of occurrence by weight which I have compared with the corresponding values for average depths by frequency.

	I	IIa	III	IV	V	Trench 3
Weight	5.8±6.08	9.1±5.00	17.3±4.16	7.4±2.97	6.3±2.39	7.4±4.97
Frequency	8.1±3.80	9.9±4.35	18.8±4.84	8.0±3.21	7.0±2.88	7.6±4.66
Differences	-2.3	-0.8	-1.5	-0.6	-0.7	-0.2

<sup>1</sup> Kümmel, 348.

<sup>2</sup> Fourteen specimens could not be located for weighing. I have interpolated the average weight of 221 specimens, 13.9 gms., for them in the series I, IIa, IV, and Trench 3. Since the distribution of the interpolated values is random, this ought not to affect the result.

## DISTRIBUTION OF ARTIFACT WEIGHTS.

Depth Below Plane of Contact (inches)	Total Weight (grams)					
	I	IIa	III	IV	V	Trench 3
0		97.1				
1						
2	56.0	1.7			10.6	
3	171.9	5.6		8.1	7.2	22.5
4	2.8	208.6		18.5	18.1	17.8
5	13.7			19.1	115.1	15.1
6		2.3		34.3	87.3	8.7
7	17.7	140.5		4.3	68.6	4.2
8	38.8	68.9		7.8	27.3	1.6
9	2.8	58.3		0.4	11.1	13.9
10		31.4	7.1	24.8		
11	39.3	19.8		8.2	8.4	3.9
12	2.2	45.5	9.6	11.4		
13			2.6	6.3		
14	32.0	186.5	209.3			
15		13.9	7.7			
16		45.4	10.7		7.1	
17		31.8	51.1			
18	8.1		6.2			
19			10.0		2.8	1.2
20		13.9	9.8			13.9
21			30.8			
22			26.8			
23			27.9			
24		85.4	31.2			
25			10.5			
26			1.8			
27			8.9			
28						
29						
30						

In every case the average depth by weight is slightly less than that by frequency. This means that in these series the center of gravity is above the center of mass. I have not investigated whether the preponderance of weight on one side is due to the larger size or greater density of the artifacts; the former seems more likely.

Unfortunately, the pebble series tabulated above were not saved. An incomplete series was obtained near Series III (eight feet distant) from an area four feet by six inches. The pebbles were obtained by passing the sand through a screen of 7.75 meshes per inch. These samples were subdivided by a screen of 4.75 meshes per inch, the subdivisions weighed, and the number of pebbles larger than the 4.75 mesh counted. These values are given in the following table as well as the weight of smaller pebbles in percent of the totals.

Depth	Weights (grams)		Number of Large Pebbles	Percentages of Small Pebbles
	Small Pebbles	Large Pebbles		
0	5.0	65.3	20	7.1
1	7.1	20.2	16	26.0
2	6.9	55.3	12	11.1
3	5.7	52.5	16	9.8
4	5.3	64.5	24	7.6
5	4.4	88.8	18	4.7
6	5.2	207.0	14	2.5
7	5.4	51.6	16	9.5
8	5.0	14.8	19	25.3
9	5.7	7.2	14	44.2
10	4.8	13.4	19	26.4
11	6.9	14.1	8	32.8
12	7.6	89.1	19	7.9
13	8.5	20.5	31	29.4
14	10.9	24.1	21	31.2
15	11.4	104.7	24	9.8
16	10.4	17.8	23	36.9
17	10.2	13.3	25	43.4
18	14.0	13.4	26	51.1
19	18.7	21.6	37	46.3
20	21.2	29.5	40	41.7
21	19.9	53.1	55	27.3
22	31.6	29.7	53	51.4
23	32.0	49.4	51	39.3
24	38.3	36.4	58	51.3

We note that in this series the weight of small pebbles <sup>1</sup> and the frequency of large pebbles increases from about the twelfth inch down. Since this

<sup>1</sup> It is obvious that we obtain a smooth series for small pebbles but not for large only because both limits of the small pebble class are fixed and close together, giving pebbles of uniform size, while only the lower limit of the large pebble class is fixed giving pebbles of varying sizes.

corresponds closely with the nearby Series III, it seems likely that this incomplete series was symmetrical but was broken off at about the modal point. If this is so, then we have for both small and large pebbles a phenomenon comparable to that already noted for artifacts and counted pebbles. In other words it does not matter how we select our series — by size mechanically as just shown, or by count of pebbles of appreciable size, or by selection of worked objects — we always arrive at the same result. This can only be the case where pebbles of all sizes and artifacts form together a homogeneous series.

Pebbles (including artifacts) form an integral component of the sand. Within the vertical limits of a pebble group<sup>1</sup> the stratum has a variable composition. Beginning at the upper limit pebbles of any given size increase to the modal point and decrease to the lower limit. Not only do large-sized pebbles occur most frequently at the modal point but all pebbles of appreciable size occur most frequently there. That is, the sand is coarsest at the modal point. In the last column of the table above are given the proportions of small pebbles to all pebbles collected. While the values are rough, the percentages increase with depth, i. e., the small pebbles increase in proportion to all the components of the sand faster than the large pebbles. This means that the stratum has a differential composition.

It is obvious that the pebbles described above comprise only a minor fraction of all components. There is a smooth gradation of sizes of sand grains from impalpable dust up to the largest pebble or boulder, with an average size smaller than our smallest pebbles. The distribution of sizes varies from group to group. The following data giving proportions by weight and percent are available.

Sieves used in Separation (mesh per inch)	2	2-4.75	4.75-7.75	7.75-12.4	12.4-18.	18.—	Total Weight of Sand (grams)
Size $\frac{1 \text{ inch}}{(\text{= Lower limit of class})}$	0.500	0.211	0.129	0.081	0.056		
Series tabulated above	1157.3		302.1				216150. <sup>2</sup>
Spoil-pile, Trench A	242.7	505.1	470.2				—
Sample collected by Volk	{ 517.9 7.9	{ 1632.7 24.9	{ 422.8 6.5	{ 101.4 1.5	{ 372.5 5.7	{ 3500.0 53.5	{ 6547.3 100.0%

<sup>1</sup> These are only the limits within which I investigated, of course.

<sup>2</sup> Estimated.



The second sample has a decidedly asymmetrical distribution of sizes, with the average grain or pebble of very small diameter; the first may be similar.<sup>1</sup> Volk's sample apparently has a bi-modal distribution, with an average for pebbles about 0.3 inch and for sand grains less than 0.056 inch. In any interpretation of artifacts as pebbles, it must be noted that they are, for the most part, very flat, two diameters greatly exceeding the third.

The second geological feature to be considered is the system of red bands. The yellow sand is traversed by red layers or films (appearing as bands in section), which occur at frequent intervals from a few inches below the surface soil down. I have mapped the red bands as seen along the side walls in Trench B, accessible parts of Trench C, and in Trench D, connecting Trench I with Pit 1 (Fig. 11). On account of their irregular character the bands were difficult to trace from point to point. Short breaks in the bands have been bridged over, so that the sketch suffers slightly from oversystematization. However, no breaks or changes of any importance were ignored. The width of the band is drawn approximately to scale. As a general rule, the thinner bands were also proportionately fainter.

The red bands generally lie from four to six inches apart. At any point along Trench B a vertical section shows the wavy bands progressively more distinct, compact, and wider from surface downward. The red bands are sections of warped planes tilted in the same direction as the present surface but on a lesser grade. They therefore approach and eventually reach the present surface. Each band becomes thinner as it approaches the surface, decreasing from two to four inches thick at its greatest depth to a mere thread at grade.

It will be noted that several bands are often fused into one, the width of which is variable, sometimes equal to the sum of the width of the individual bands, and again equal to the width of only one. Two bands may be pointed out which can be traced for a considerable distance and which exhibit this feature: the band AA' beginning at 4 ft. 8 in. below the surface at the point 211 on the profile, reaching the surface soil 71 ft. west (point 140), the drop of the surface being 4 ft. 11 in. in this distance, that of the band 10 in.: also the band BB' beginning 5 ft. 1 in. below the surface at the point 176, reaching the surface soil 74 ft. west (point 102), the drop of the surface being 5 ft. 4 in., that of the band 6 in.

I presume that the bands, or rather planes, are parallel with the surface of Trench C, throughout its length. In the eastern part of this trench, it will be noted that the bands parallel the surface: most prominent among

<sup>1</sup> Gilbert, (a), 177, tabulates data for a natural fluvial mixture which shows the same asymmetry.

them being a wide and compact band in the central portion of this section which disappears abruptly.

On the sketch will be found several isolated portions of red bands, also others ending not at the surface soil but at some point in the yellow sand. These could not be traced beyond the limits shown.

Of interest is a hard layer of black material appearing at the western end of Trench B and in the middle of Trench C. This band closely resembles the red bands in position, thickness, compactness, etc. Fragments of the same material are frequently encountered throughout the yellow soil and might be mistaken for charcoal.

The bands extend throughout the deposit from Lalor field to the Abbott farm. They always occur "in the same order and composition" according to Volk, but showed a different arrangement<sup>1</sup> in a few instances.

Wright gives an analysis of a series of bands in Lalor field: —

Stratum	Thickness <sup>2</sup>	Percent of Clay	Percent of Iron
Sand	7"	18	—
Red Band	$\frac{1}{2}$ "	24	—
Sand	6"	16	0.5
Red Band	2"- $\frac{1}{2}$ "	27	1.5
Sand	4"	14	—
Red Band	2"-3" } 10"	27	—
Sand		—	—
Red Band		37	1.5
Sand	—	7	—

These red bands, therefore, are not to any appreciable extent segregations of iron. The iron scarcely more than suffices to give the color. The analysis shows, therefore, that these red bands contain from 25% to 33% more clay than is found in the interstratified strata of sand.<sup>3</sup>

Kümmel states: —

that the 'red clay films' observed at various intervals in the sand are not, in my opinion, lines of stratification at all, nor are they always strongly clayey. They are partly, at least, zones or bands of infiltration and deposition of ferric oxide which has somewhat cemented the sand grains.<sup>4</sup>

Wright's analysis refers to the same trenches from which Mercer's 1897 series were taken. These gave average depths for artifacts  $9.8 \pm 4.87$  and pebbles  $11.7 \pm 5.96$ . The bulk of artifacts and pebbles fell in the

<sup>1</sup> Volk, (b), 7, 103-15.

<sup>2</sup> Beginning below a "zone of doubt" of 15 inches.

<sup>3</sup> Wright, 358.

<sup>4</sup> Kümmel, 348.

second sand stratum. The red planes cross the group but may have no causal relation to it. Similarly with Series I (Trench 2) there were no red bands; Series IIa and IIb (Trench 1) thin, faint bands at 13, 15, and 18 inches with averages of series  $9.9 \pm 4.35$  and  $10.2 \pm 4.67$ ; Series III (Trench B) a heavy band at 44 inches with averages of artifacts  $18.8 \pm 4.84$  and pebbles  $21.2 \pm 3.8$ ; Series IV (Trench C) faint bands at 3, 5, and 19 inches and heavy bands at 28 and 33–35 inches with average of  $8.0 \pm 3.21$ ; Series V (Trench C) a faint band at 12 and heavy bands at 24 and 30 inches with artifact and pebble averages of  $7.0 \pm 2.88$  and  $9.1 \pm 4.37$ ; and Trench 3 with a faint band at 5 inches and heavy bands at 11, 18, 26, 32, and 36 inches with the artifact average of  $7.6 \pm 4.66$ . In other words the seriation of red bands and pebbles is not the same, but occurs in variable relations.

Dr. Chester A. Reeds suggests that the red bands represent films of clay and decomposed iron bearing black mica (biotite) which have been subjected to the periodic oscillation of the ground water level and oxidation. The iron serves as a cement and if present in considerable amount binds the sand, pebbles, and clay together forming "peanut rocks" when indurated. The position of the ground water level at present is indicated by the following data.

Position	Point on Profile (Fig. 3)	Depth below Surface (feet)	Height above Flood Plain (feet)	Grades
Abbott's Brook	1061	Brook bed	47.5	} 1.21 1.26 1.64
Trench C, east end	664	7.3	42.7	
Trench A	315	12.5	38.3	
Trench B, west end	53	4.5	34.0	
Abbott's Brook	31	Brook bed	34.5	
Trench 1	(190)	3.3	43.9	
Well	-389	4±	25.5±	
Spring at Bluff	-554	Face of bluff	25.5-	

These grades are, of course, less than the surface grades.

These data show that the artifacts are one component of a series of pebbles which extend throughout the sand deposit, at least in the vicinity of the bluff, in a single plane of maximum deposition. Inasmuch as all the

pebbles, from boulders down to sand grains, are an integral part of the sand deposit it necessarily follows that a single cause of deposition has acted on artifacts and sand alike. Earlier investigators have variously favored the following causes of deposition: occupation of the site with accidental inclusion of the artifacts in the sand by the action of wind or water, or the deposition of sand and artifacts by a stream aggrading its bed.

Assuming that the distribution curve characterizes the occupation of the site, it can be compared, Wissler suggests, with distributions in culture deposits. A number of pottery tables for the ash heaps of Southwestern ruins are available. Only the total number of fragments representing the fluctuations of the whole ceramic art give distributions comparable to the series at Trenton since that represents the culture as a whole. It is assumed that the intensity of the ceramic art was uniform, and therefore fluctuations in the quantity of sherds indicate corresponding changes of population. Nelson's San Cristobal table <sup>1</sup> shows relative uniformity in the total number of sherds at each level, at least there is no progressive rise or fall in these values. Kidder's Pecos tables <sup>2</sup> give similar results in all cases. In both pueblos certain types of pottery give distributions of the normal type: San Cristobal type I and type II redware, and Pecos Test X glazed ware. But these are not comparable to the Trenton series since they represent fluctuations in single cultural traits — stylistic pulsations — which attain their maxima at the expense of other similar traits. Similar series could be obtained at Trenton for every culture trait — various types of arrowheads and blades — but these would give normal curves merely because the entire group was of that form. These stylistic series are not comparable with the whole Trenton series. I have found that ash heaps at ruins in the Zuñi country give a variety of distributions.<sup>3</sup> Sites 97, 104, 121, 139, and 161 show relatively uniform distributions; Sites 71, 146, and 152 an increase in the number of sherds. At Site 140 the section within the pueblo gave a rather uniform series, possibly with a decrease at the start and an increase at the end, while the section outside the ruin shows an increase. At Site 48 the two sections are stylistically equivalent, but the second shows a decrease in the number of sherds. Site 33 alone gives a normal curve. This does not require individual treatment but is susceptible of explanation in common with the others. All of the fluctuations must represent either changes in the entire population or, as at Site 48, a shift in the use of the refuse heap. It is most probable that at Site 33 the distribution represents the growth and decline of the pueblo as a whole. A similar case is given by Gamio for Teotihuacan.<sup>4</sup> In the refuse at this city the pottery has a

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<sup>1</sup> Wissler, (a), 195.

<sup>2</sup> Kidder, 342-347.

<sup>3</sup> Spier, (e), 256-262.

<sup>4</sup> Gamio, Plate II.

distribution resembling the normal type, but with two maxima of frequency. Gamio suggests that the curve reflects the occupation of the city as a whole, with the two maxima coinciding with architectural changes. In this case also a single style, the Aztec type, gives a normal curve. I have checked out the distribution of objects in a shell-heap reported on by Loomis and Young<sup>1</sup>; since this series includes all artifacts it is more strictly comparable to the Trenton series than the pottery distributions. Aside from the well-known phenomenon of "rounding-off," the distribution is clearly uniform and therefore unlike the Trenton series.

So far as these cultural data go, they show that normal curves may be expected as a result of a rise and decline either of the intensity of a cultural trait or of the whole population. The first is out of the question at Trenton; the second seems unlikely, since the pebble distribution and the horizontal alignment of the artifacts over a wide area are against such an interpretation.

Direct comparison with the distributions in a known water deposit is possible with only one series, collected by myself; I have been unable to find any published records of others.

This series was taken from a superficial sand deposit<sup>2</sup> which presented conditions closely similar to those at Trenton. The sand was light and loose, and relatively free from pebbles. Smaller pebbles were more common at the modal point of the series than at the extremes of the range. Overlying the starting point of the series was 20 inches of clear sand.

Depth Below Surface. (Inches)	Frequency.
20	5
22	21
24	49
26	60
28	38
30	128
32	180
34	100
36	72
38	33
40	28
42	20
44	14
46	10
48	0
50	2

<sup>1</sup> Wissler, (a), 196.

<sup>2</sup> At the Havasupai Indian village in Cataract Canyon, a tributary of the Grand Canyon of Arizona. In 1910 a devastating flood completely redistributed the sand floor of the canyon. The series had to be made surreptitiously and is therefore not very accurate.

This series represents a normal frequency distribution, with perhaps a suggestion of asymmetry, i. e., with a slightly greater range in the lower depths.

Water deposited pebbles undoubtedly occur in other distributions, but the identity of this distribution with the Trenton series clearly indicates the possibility of water having deposited that series.

## CULTURAL TRAITS.

Cultural traits preserved in this deposit are few. There is no evidence of the type of occupation with which the artifacts were associated. As the deposit stands, it clearly does not represent a village site: Volk's references to "work shops," "fireplaces," and "pits" which point in that direction are susceptible of other interpretations (p. 187).

The artifacts are of a few and simple types and all of stone. These are arrow-heads and larger chipped blades, pitless hammerstones, and one rubbing stone. The bulk of the objects found were mere flakes, which may include scrapers and, in addition, some fractured pebbles.

The several types of chipped forms were determined by a series of trial groupings: the types which are recognized are the groups with the greatest number of representatives. The number of specimens definitely recorded from the yellow sand is small, sixty-six. To these I added ninety-six others of the same general form and patination but taken from the layer of sand which Skinner had included in his "zone of doubt" (p. 180). While a few of these may be of Lenapé origin the majority belong with the older culture since I found the same relative distributions of both series of specimens in the type-groups. Thirteen types were determined by inspection, the specimens mixed and distributed into thirteen groups three times. Specimens, which fell twice in one group and a third time in another were included with the first group. Specimens, which fell successively in three groups were included with those nearest in form. The number in each group is given in the following table: —

Group	Arrow-heads								Large Blades					Totals
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	
From yellow soil	17	11	2	7	2	4	7	1	4	3	2	6	0	66
From "zone of doubt"	35	13	3	3	0	13	15	1	3	1	4	3	2	96
Totals	52	24	5	10	2	17	22	2	7	4	6	9	2	162

The typical forms of arrow-heads are I, II, IV, VI, and VII, and of large blades IX, XI, and XII (Figs. 6, 7, and 8).

Type I is the so-called "fish-spear,"<sup>1</sup> a long slender blade of rather rounded cross-section, as frequently notched as stemmed and occasionally

<sup>1</sup> Abbott, (d), 267.





Fig. 6 (20.0-7414, 7319, 7310, 7307, 1448d, 7455, 8102, 7315, 7378, 8261, 8147, 8177, 107, 7398, 7473, 7474). Arrow-heads: Types I (a-j) and II (k-p).  $\frac{1}{4}$  Nat. Size.



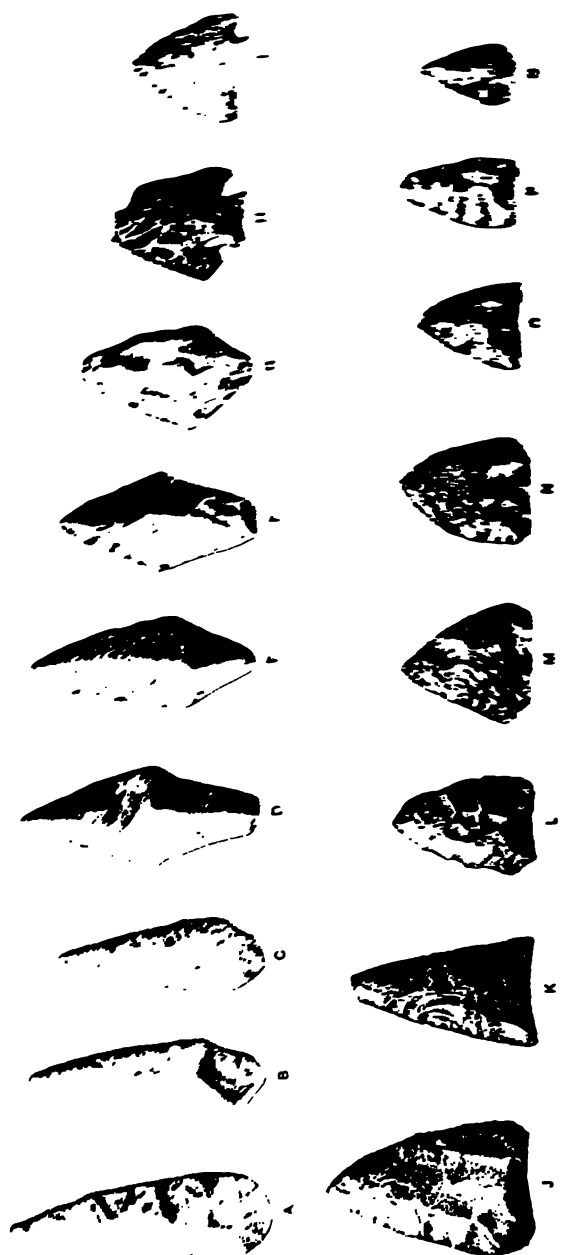


FIG. 7 (20.0-7420, 7342, 7370, 7300, 7053, 7100, 7107, 7080, 7011, 7114, 7401, 7080, 7080, 7080, 7170, 7100). Arrow heads. Types III (h, i), IV (a-c), V (q), VI (d-g), VII (j-o), and VIII (p). † Nat. Mus.

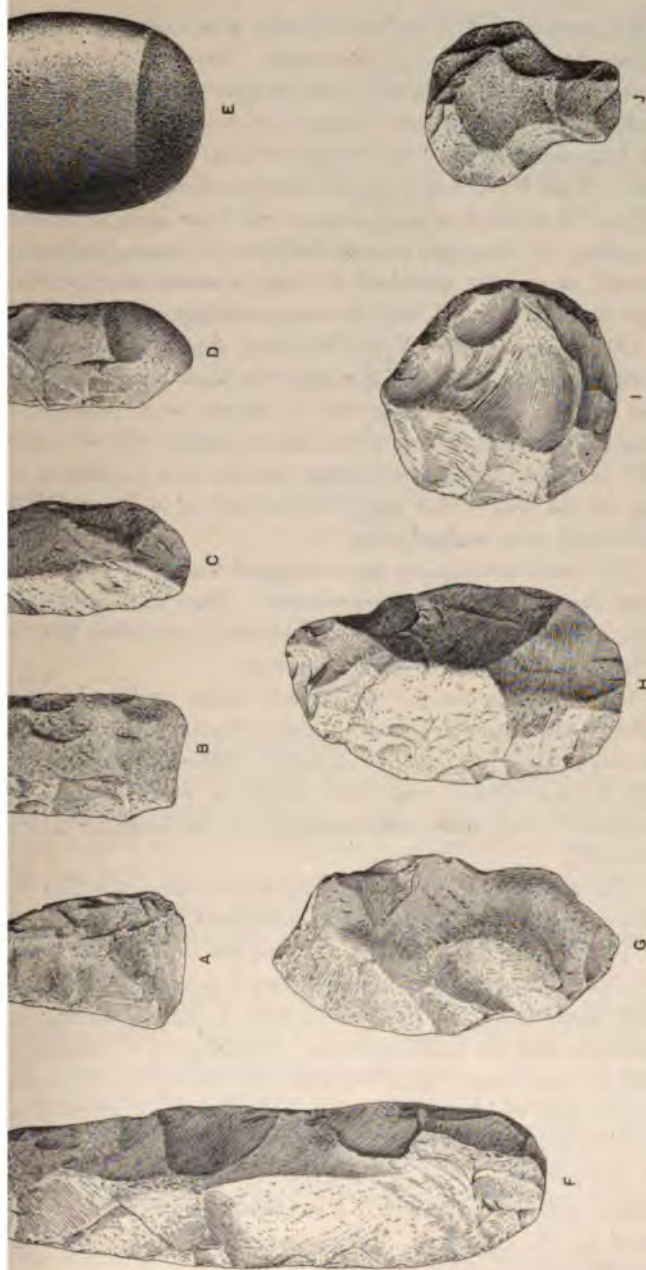


Fig. 8 (20.0-7312, 7306, 7515, 8135, 7328, 7296b, 7363, 7300, 7570, 7566). Large Blades: Types IX (a, b), X (f), XI (c, d), XII (g-i) and XIII (j); and Rubbing Stone (e).  $\frac{1}{4}$  Nat. Size.

with a marked flare of the edges at the base instead. Type II is a broader, thinner blade, notched or stemmed. Some of the smaller specimens of Type II are indistinguishable from smaller points of Type I. Type III is a small triangular thin point, deeply notched from the base edge. Type IV is a long slender point, like Type I of oval cross-section, and with a round base. Type V is a much smaller and broader point of the same type.

Type VI is small, lozenge-shaped, the base being somewhat blunter than the point; in the cross-section the blade is trapezoidal or oval. Type VII is small, triangular, and flat; the base is sometimes incurving. Type VIII is similar to Type VII, but the forward edges are convex.

Of the larger blades, Type IX is long, sharply pointed and with a straight or rounded base. Type X is a long, flat blade with parallel edges and round ends. Type XI is similar but is shorter and proportionately broader. Type XII is a flat oval or round blade equally chipped on all edges. Type XIII is shaped like a longitudinal section of a mushroom with the cutting edge at the top. This may be the butt of a longer blade which, when broken off, was worked over.

The workmanship of these chipped blades is not crude but does not equal the best of Lenapé specimens. They seem to be entirely chipped; some may have been ground or rubbed in addition but the disintegrated surface gives no clue of such operations.

Pitless hammerstones are merely more or less battered pebbles and without distinctive features. One of these, a small boulder (20.0-8211), has two parallel faces ground smooth. The single rubbing stone (20.0-7328) (Fig. 8) is a pebble with four ground or rubbed facets at the ends. It resembles a very blunt double-edged ax: in longitudinal cross-section it is six sided.

The additional finds were stone flakes some of which may be scrapers, a few broken pebbles, possibly fire-fractured, and fragments of human bones.

This exhausts the list of cultural remains. Our smaller series agrees with Volk's five types collected during a period of twenty years: the spear head, arrow-head, an implement with a jagged cutting edge, a drill-like specimen, and the hammerstone. The paucity of cultural traits is emphasized by comparing this list with the multitude of forms known to the Lenapé and which are found in the black soil immediately above. Dr. Abbott's older works "Stone Age in New Jersey" and "Primitive Industry" are not precise enough for a detailed comparison but cover the range of Lenapé remains fairly well. I reproduce below a list of Lenapé forms prepared by Mr. Skinner.<sup>1</sup> Types marked with an asterisk also occur in the "argillite culture."

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<sup>1</sup> Skinner, (b), 53-54.

- |   |  |
|---|--|
| <p>I Chipped Stone</p> <ul style="list-style-type: none"> <li>* Large blades</li> <li>* Spear points</li> <li>* Arrow points</li> <li>Drills</li> <li>* ? Stemless scrapers</li> <li>Stemmed scrapers</li> <li>Bizarre chipped forms</li> </ul> <p>II Rough Stone</p> <ul style="list-style-type: none"> <li>* Pitless hammerstones</li> <li>Pitted hammerstones</li> <li>* Rubbing stones</li> <li>Arrow smoothers</li> <li>Sinew stones</li> <li>Pestles</li> <li>Mortars</li> <li>Grooved axes</li> <li>Celts</li> <li>Grooved mauls</li> <li>Grooved clubs</li> <li>Grooved sinkers</li> <li>Notched sinkers</li> <li>Perforated sinkers</li> <li>Ceremonial stone heads</li> <li>Gouges</li> <li>"Slick stones"</li> </ul> | <p>III Polished Stones</p> <ul style="list-style-type: none"> <li>Gorgetts (two types)</li> <li>Banner stones</li> <li>Stone tubes (several types)</li> <li>Stone pipes</li> <li>Other objects</li> </ul> <p>IV Engraved Stone Objects</p> <ul style="list-style-type: none"> <li>Portraits</li> <li>Animals, etc.</li> </ul> <p>V Native Copper</p> <ul style="list-style-type: none"> <li>Spears</li> <li>Arrows</li> <li>Celts</li> <li>Beads</li> </ul> <p>VI Pottery</p> <ul style="list-style-type: none"> <li>Vessels</li> <li>Pipes</li> <li>(Many types of both)</li> </ul> <p>VII Bone and Antler</p> <ul style="list-style-type: none"> <li>Awls</li> <li>Cylinders</li> <li>Arrow points</li> <li>Other objects</li> </ul> <p>VIII Shell</p> <ul style="list-style-type: none"> <li>Beads, etc.</li> </ul> |
|---|--|

This list is not exhaustive but shows the range of Lenapé forms. The number of types common to both cultures is small; whole classes of objects are not represented in the "argillite culture." Of course, it is possible that perishable materials, such as wood, shell and bone, played a large rôle in the older culture but have not been preserved. The absence of shell and bone artifacts is noteworthy, since parts of two human skeletons were found. While the remains were fragmentary, they were sufficiently preserved for identification.

In detail the types of arrow-heads in the "argillite culture" are fewer than in the Lenapé remains. While I have no precise data on the point, this can be easily seen in any representative collection.

The list of missing traits is impressive. Pottery is entirely absent: there is no evidence of drilling in stone: net-sinkers are also absent, as well as the finer types of stone implements. No foodstuffs were found so that is impossible to say whether the absence of pottery is connected with the absence of maize.

All of these finds corroborate the contentions of Abbott and Volk that we have a simple older culture here set over against the comparatively

rich and varied culture of the historic Lenapé. While the older culture is rude, it is not crude.

Earlier investigators have objected to the asserted position of the "argillite culture" on the grounds that such objects had worked their way down from the black soil into the yellow sand through root holes, uprooted trees, by the agency of burrowing animals, or by other similar accidental means. It is inconceivable that such a segregation of objects should have brought about a cultural distinction.

All of the objects from the yellow soil constitute a homogeneous unit; that is, we have found nothing that we may not refer to a single culture. It would be interesting if there was a sufficient number of specimens to see whether there is any vertical differentiation of types. The tabulation above of the thirteen groups of objects gives us something of the sort. Here the "zone of doubt" includes the uppermost twelve inches or so of yellow soil; the other specimens are from a wider vertical range including this zone. There is no significant difference between the two groups. It is unlikely that any such differentiation would be found in view of the manner of distribution of the artifacts and pebbles.

The name "argillite culture" was applied to these remains by earlier investigators who asserted that the stone used was argillite alone or that argillite predominated.<sup>1</sup> Certainly most of the objects are alike to the superficial observer. They are characterized by an alteration of the surface to a chalky consistency with a characteristic greenish or yellowish gray color. A series of these objects with a few similar specimens from Staten Island were selected by Dr. C. A. Reeds and forwarded to Dr. J. Volney Lewis for identification. Dr. Lewis found that these were argillite, hornfels, sandstone, and siliceous oolite. Argillite constitutes over half of the series. The relative abundance of the materials is in proportion to the proximity to Trenton of outcrops of the same in northern New Jersey and adjacent sections of New York and Pennsylvania. The implements may have been made from river pebbles or from pebbles in the stratified drift of the Cape May formation, in which, of course, their relative abundance is naturally the same.

Dr. Lewis's statement concerning the age of the artifacts is worth reproducing in full.<sup>2</sup>

From the petrographic examination of the materials alone no very definite conclusions can be drawn as to their age, but some of them are manifestly very old. Several of the blackish argillites are so bleached and altered that they are now a pale

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<sup>1</sup> Artifacts of argillite were first recognized by Prof. M. E. Wadsworth.

<sup>2</sup> Lewis 201

yellowish gray, and the bleaching has penetrated so far that only the central portion, or even a small central spot, retains the original color. These conditions are notably shown in Nos. [20.0-] 7303, 7448, 7476, 7485, and 7517, from Trenton, and in No. 4227 from Staten Island. One specimen from Trenton (No. 7485), undoubtedly a bleached argillite, is pale grayish in color throughout. Also the reddish quartzite from Trenton (No. 7333), originally a dark grayish rock, now has only a small central spot of this color.

The great age of these specimens is beyond question. They have been bleached by long exposure to the weather and the shallow ground waters since they were worked into their present shape. This process, especially in the dense argillites, is a very slow one, as may be seen in the natural outcrops of these rocks, which are decolorized to only a shallow depth as a rule.

On the other hand, some of the specimens are in a comparatively fresh condition, even on the surface. Apparently these are either less ancient or they have been imbedded in soil of a denser texture and hence have not been so fully exposed to the weather and the percolating ground waters.

## SKELETAL REMAINS.

As a positive contribution to this subject I have only a mass of fragmentary bones without any definite character. In addition it is necessary to review some of the published accounts of skeletal material supposed to be associated with the argillite culture. It should be obvious that the only finds which can be considered in this connection are those with a definite association by virtue of their stratigraphic position.

The new remains are the series of bone fragments from Trench I considered above (Series II b). The fragments are very small and their identification was made possible only by the fortunate inclusion of three *ossa temporale* (Fig. 9). They have been identified by Dr. William K. Gregory and Mr. Louis R. Sullivan as the remains of two adolescents. Mr. Sullivan's report is given in the following paragraphs.

As a whole, the total series of several hundred bone fragments are very small and for the most part lack the distinctiveness necessary for specific identification. By far the greater number of them represent fragments of long bones. In only one instance does a fragment represent an entire cross-section of the shaft. About twelve of the fragments exceed an inch in length but the remainder are much smaller.

In the cranial fragments we are more fortunate in having preserved five fragments which may be positively identified as representing portions of the pars petromastoid of three *ossa temporale* of a mammal. Three of the five fragments represent that portion of the pars petrosa bearing the internal acoustic meatus and subarcuate fossa. In these specimens the subarcuate fossae are mere pits. According to the findings of Dr. William K. Gregory this condition of the subarcuate fossa is characteristic of man and the higher anthropoids only; all other mammals have the subarcuate fossae open. The higher anthropoids are at once eliminated by their absence from America.

When we compare these specimens with the pars petrosa of an adolescent individual we find almost an identity in the conformation and position of the internal acoustic meati, subarcuate fossae, and arcuate eminences. Two of these fragments, undoubtedly, form a pair while the third represents the pars petrosa of a third left *os temporale*. Further comparison with the same skeleton enables one to identify other fragments as follows: a portion of the processus fronto sphenoidalis of the *os zygomaticum*, portion of the pars orbitalis of the *os frontale*, various portions of the *os occipitale* and other bones of the brain case, three portions of the shaft of the tibia, one fragment of the head of the tibia, two fragments of the femur, the inferior articular process of a lumbar vertebra and the superior articular process of a dorsal vertebra.

There is no reason to suppose that these fragments represent more than two individuals. It also seems safe to say that they represent the fragments of human skeletal remains of two adolescent individuals.

It was noted above that these fragments were found among artifacts having an identical distribution (Series IIa). Since the fragments were all



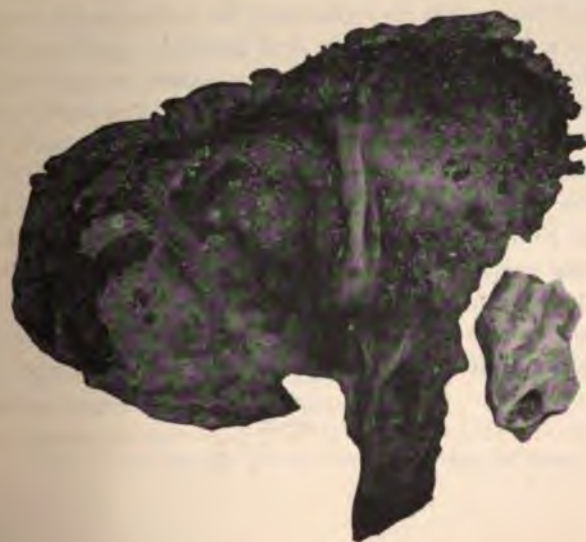


Fig. 9.



Fig. 10.

Fig. 9 (20.0-7107). Ossa Temporale of an Adolescent Individual and a Fragment from Trenton.  
 Fig. 10 (99-0508, 20-12300). Obliquely Placed Orbits from Trenton and of Skull from a Grave at Orangeport, New York.



found within a diameter of three feet and represent only two individuals, it is evident that the entire series must have been deposited at about the same time. There is nothing in their arrangement to suggest a burial. Since the fragments cannot be separated and assigned to the two individuals, I do not know whether the two occurred separately: it seems unlikely.

A number of skeletal remains from this region have been reported on by Russell and Hrdlička in view of their possible association with early remains. These consist of a piece of frontal bone, a fragment of a lower jaw, a third molar tooth, a portion of a femur, three skulls named after the localities in which they were found, "Gasometer," "Burlington County," and "Riverview Cemetery," and pieces of crania, long bones, etc., from the "deep burials" on the Abbott farm. Abbott and Volk suggested the association of the frontal bone, the lower jaw, the molar tooth, and the femur with the gravels in which they were found (and with their "paleolithic culture"). They are then of no concern for the argillite culture. The "Gasometer" skull, found in the southern angle of the junction of Assanpink Creek with the Delaware at a depth of twelve feet, lay well outside of the area in which Volk found the remains of the argillite culture. The "Burlington County" skull which was found at Sykesville, Burlington County, about twelve and a half miles southeast of Trenton, where it rolled out of the bank of a brook, also lay outside of the culture area. While both of these skulls may have an intrinsic interest because of their geological position or morphological character, there is no legitimate reason for connecting them with the argillite culture. The "Riverview Cemetery" skull presents a slightly different case. It was found in an elevated part of the cemetery at a depth of about three feet. Since the point at which it is found is not far from the culture area and its depth not greatly divergent from the normal depth for cultural remains, there is a possibility that this skull should be considered with the culture. On the other hand, Volk defines the culture as beginning at the Riverview Cemetery and extending east and south. Presumably, he does not include the cemetery and nowhere else does he speak of cultural remains having been found there. The skull has certain peculiar characters which it shares with the "Burlington County" skull, according to Hrdlička, and is similar to a local European type.<sup>1</sup> The affiliation of this skull is, therefore, not clear: it seems unlikely that it is associated with the argillite culture.

The "deep burials" from the Abbott farm were found by Volk in 1899. They were taken from a trench running eight feet from the ravine cut perpendicular to the bluff by Abbott's Brook; the first two heaps of bones

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<sup>1</sup> Hrdlička, (b), 36-46.

(Volk's Fig. 21, e and f) being found about twenty feet back from the bluff and the third (Volk's Fig. 21, d, catalogued as two heaps) about twenty-five feet further in. The heaps lay from four to four and a half feet below the black soil at the base of the yellow sand stratum.<sup>1</sup> In the heap "farthest south" (f?) was found an argillite implement. These groups lay below the plane of maximum frequency of artifacts. Their position is at the extreme edge of the sand stratum where it abuts on the higher Pensauken terrace. Abbott's Brook, which follows the margin of the two deposits, must be a comparatively old drainage trough. Since the heaps were so close to the brook, there is a possibility that at some time they were moved within the deposit or introduced from elsewhere at a time when the brook was reworking its bed. Inasmuch as the little brook has cut a ravine thirty or forty feet deep at this point, such a redistribution must be comparatively old. In any event the bones have some antiquity; whether they are in definite association with the argillite culture is not clear. In view of this possible connection and because of their intrinsic interest, Mr. Sullivan has furnished the following report:—

I have been asked to examine four lots of human bones representing the "deep burials" excavated by Mr. Volk. All the bones came from the same trench but from two distinct "graves" in lots of two heaps each. The bones now catalogued in the American Museum of Natural History as 20-12300 and 20-12302 (probably Volk's Fig. 21, e and f, respectively) were found close together in one part of the trench and those catalogued as 20-12321 and 20-12324 (probably Volk's Fig. 21, d) were found in close association in another part of the trench. Most of the bones were fragmentary and showed considerable degrees of disintegration. Lots numbered 20-12300 and 20-12302 were in a slightly better state of preservation than lots numbered 20-12321 and 20-12324. In all we have parts of at least seven skeletons, distributed as follows:—

**Catalogue 20-12300:—**

Portion of a right parietal.

A nearly complete frontal with small portions of the parietals.

That portion of the left orbit consisting of a portion of the frontal, sphenoid, and malar.

The atlas.

The axis.

A portion of the left parietal of a second skull.

The proximal portion of a left femur.

The acetabular portion of a right innominate bone.

The distal ends of one right and two left humeri.

Distal end of a left radius.

**Catalogue 20-12302:—**

The right temporal with fragments of the parietal and occipital.

Another fragment of the right parietal.

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<sup>1</sup> Volk, (b), 101, 102 and chart in American Museum.

A small piece of the left maxilla bearing two molar and one premolar tooth.  
 The right and left gonial region of a mandible and two fragments representing the right gonial region of two other mandibles.  
 The proximal and distal portions of a right femur.  
 A right humerus.

Catalogue 20-12321:—

A small portion of the right orbit.  
 Greater wing of the left sphenoid and fragments of the palate bones.  
 Another skeleton is represented by:—  
     A nearly complete right parietal with a portion of the frontals.  
     A large portion of the sphenoid.  
     The basi-occipital.  
     A nearly complete right femur.  
     A left tibia.  
     The acetabular region of the right innominate.

Catalogue 20-12324:—

A large portion of an occipital with a portion of the right parietal and temporal  
 The right and left femora.  
 The left ulna.  
 A right and left tibia.  
 Fragments of the clavicles and scapulae.

Uncatalogued parts consist of fifty fragments of ribs, thirty teeth, a nearly complete right tarsus and a left calcaneum and cuboid.

In spite of the fragmentary nature of the bones they show certain characteristics pointing to their racial identity. All of the bones must be considered together.

If we examine first the teeth we find among the lot one lateral and one mesial upper incisor. These teeth both show the marked infolded concavity on the lingual surface which is so characteristic of the incisor teeth of American Indians. This would seem to indicate that the bones represent the skeletons of American Indians. The other teeth show no marked peculiarities. Seventeen are molars, seven are premolars, and four are canines. They all conform to the normal dentition of modern Indian skulls.

Examining next the fragments of skulls we find that none of them are of sufficient size to warrant measurements of definitive value. The portions of frontal, parietal, and occipital bones appear to be more or less warped or distorted. One fragment about eight centimeters square representing the external half of the left orbit (20-12300) is of interest and in my opinion throws some light on the identity of the burials. That portion of the orbit remaining represents an unusually low and obliquely placed orbit. At first this appeared to be only an individual variation. Examination of a considerable number of skulls of American Indians showed this particular form of orbit to be of fairly frequent occurrence among Indian skulls coming from the eastern United States. To be more definite, this peculiar conformation of the orbit was found in some twelve eastern skulls. In skulls numbered 20-3190, 99-4717, and 99-6598 coming from Staten Island and northern New York State, the agreement amounted almost to an identity (Fig. 10). None of the other cranial bones showed features of peculiar interest.

The long bones have been described and measured in detail by Dr. Hrdlička. At that time the bones had not been catalogued and arbitrary numbers which have not

been preserved were used. For this reason it is impossible to refer to specific bones listed by Dr. Hrdlička. These bones, undoubtedly, belong to large and strong individuals above the average stature. Of special interest are the femora. They show a marked flattening of the proximal portion of the shaft. The following measurements help define that flattening:—

Femora.				
Catalogue Number	Side	Transverse Diameter	Sagittal Diameter	Platymetric Index
20-12300	left	3.6	2.3	63.9
20-12302	right	3.7	2.2	59.5
20-12321	right	3.2	2.3	71.9
20-12324	left	3.4	2.8	82.4
				Average 69.4

The absolute measurements of the transversal diameters are of interest. They are rather larger than the average for American Indians. Platymery is fairly common among American Indians yet by no means universal. The collections of the American Museum represent fairly well the distribution of this characteristic on the two continents. I was able to match this degree of flattening in association with femora of the same size only among Indian femora from the eastern United States. Again, to be more specific, comparisons revealing an approach to identity were found in skeletal remains from Long Island, Manhattan Island, and some of the southern New England States. However, very similar femora were found in a skeleton from Patagonia.

In conclusion then it seems safe to infer from the incisor teeth mentioned above that these bones represent the skeletal remains of American Indians. Furthermore, the peculiar conformation of the orbital region and the size and degree of flattening of the femora permit us to conclude with a very high degree of probability that these remains belong to that particular local type of American Indians inhabiting the eastern United States in the neighborhood of New Jersey, New York, and southern New England. The antiquity of the skeletal remains must be decided wholly upon geological considerations. The morphological characteristics do not necessitate any separation from the more recent Indians in physical type. On the other hand, this in itself does not militate against a considerable antiquity as estimated in years.

## EXTRA-LOCAL RELATIONS.

The foregoing account of the argillite culture shows a localized deposit of remains culturally different from those of the Lenapé and lying in an older stratum. Since the artifacts are an integral part of the sand it follows that they were deposited with the sand. The features of the stratum seem to fit best, as far as our knowledge goes, with fluviatile deposits. As such, our finds may not represent the culture as a whole and the original associations of the culture may, therefore, be unknown. In any event, other similar sites must be found; either an undisturbed camp site or similar natural deposits. The following notes on a number of sites visited, as well as others which have been described elsewhere, give some suggestive points.

In 1913 I found anomalous camp sites at Plainfield, forty miles northeast of Trenton. These are in areas mapped with the Cape May formation, which also extends as a narrow valley train up the Millstone River and down Assanpink Creek to southern Trenton. There is a suggestion here that the Trenton area represents the delta of Assanpink Creek when that stream flowed the entire distance from Plainfield. Following this suggestion, I first examined the older Pensauken terrace south of the Abbott Farm (with negative results) and then searched northward along Assanpink Creek. A great part of this valley is semi-swamp, so that large sections of Cape May area could not be examined. I found nothing northeast of the city until I reached Franklin Corner, south of Lawrenceville, again at Port Mercer, and at a point one half mile further north.

At each site I found a small group of arrow points and chips scattered over an area of a dozen yards. So far as I can judge, these are mostly argillite, with the same characteristic disintegration of the surface as at Trenton.

The site at Franklin Corner, on the farm of Mr. William S. Duncan, lies at the edge of the Cape May deposit which is only three feet thick at this point. A fifty foot trench was dug. Artifacts and pebbles were infrequent. There were no red bands as at Trenton. The distribution of twenty-six specimens was as follows:—

Depth below surface (inches)	Frequency
4	4
5	6
6	1
7	0
8	5

Depth below surface (inches)	Frequency
9	0
10	0
11	1
12	0
13	3
14	4
15	2

The upper ten inches is within the plowed area. It is possible that the double grouping is due to this. These figures do not seem significant.

The second site is on the farm of Mr. William S. Schenck, near Port Mercer, in a field west of the Mercer-Somerset county line. The third lies a half mile north of Port Mercer, in a field east of the point where the Princeton trolley line crosses Stoney Brook. The deposits were also examined as far as Kingston. I have been told that similar disintegrated argillite specimens have been found along the Millstone River.

Further north all cleared lands from Somerville to the terminal moraine east of Plainfield were examined. Nothing was found about Somerville and Findern. Weathered argillite fragments (chips?) were found at South Bound Brook and a mile east of East Bound Brook.

In 1913 I found several sites near Plainfield where implements and chips of argillite or a similar material predominated.<sup>1</sup> There are many such objects in local collections. Trenches were dug in a site located just north of the entrance to the Lehigh Valley Railroad coal yards half a mile south of South Plainfield. The black soil, 5 to 7 inches deep, overlies a yellowish-red sand. The distribution of finds is as follows:—

Depth below Black Soil (inches)	Frequency
1	1
2	3
3	4
4	3
5	8
6	1
7	2
8	1
9	0
10	1
11	1
12	3
13	4
14	0

<sup>1</sup> Spier, (b), 77-79.

Many fire-cracked stones were found at one point in a compact group from 11 to 14 inches below the black soil. These figures probably have no significance. Here too the argillite specimens found showed the same greenish, chalky surface seen on Trenton specimens.

Mr. Skinner has also called attention to a site south of Bridgeton on Cohansey Creek where argillite implements occur alone.<sup>1</sup>

Reports of argillite implements led Mr. Skinner to examine the valley of the Susquehanna River and its tributaries in the vicinity of Bloomsburg, Pennsylvania, and I examined that of the Chemung River near Elmira, New York. These implements, argillite, rhyolite, etc., do not show any of the characteristics of the Trenton finds. Stratified sites with suggestive similarity in the Trenton finds are Mercer's Lower Black's Eddy site and Hawkes and Linton's Masonville and Medford sites.

Mercer's site is located at Lower Black's Eddy on the bank of the Delaware near Point Pleasant, Pennsylvania.<sup>2</sup> Two culture horizons were found: a surface layer of historic Indian refuse,  $2\frac{1}{2}$  to  $3\frac{1}{2}$  feet deep, below this a barren region  $1\frac{1}{2}$  to 3 feet deep, resting on a layer of older remains 1 foot to 1 foot 10 inches deep. The upper layer yielded the following forms: polished celt, hammerstone, net-sinker, blades and arrow points of quartz, quartzite, chert, jasper, a red stone, and argillite (chert and jasper arrow points of triangular type), fire-cracked pebbles, bones, three types of native pottery, and European objects. In the lower level were the hammerstone, net-sinker, blades and arrow points of quartzite, chert, jasper, and argillite (arrow points chiefly of "fish-spear" type), and potsherds of coarse type. According to Mercer's identification of 1526 objects in the upper layer, argillite outnumbered other materials in the proportion 4 to 1, among 462 in the lower layer by 12 to 1. He also finds the difference in arrow point form significant. Since the whole site is known to lie within the sphere of freshet activity, no certain claim can be advanced for the antiquity of the lower layer.

The range of implement types, except for the two potsherds in the lower layer, suggests a resemblance to the Trenton finds. The occurrence of the "fish-spear" type and perhaps the proportion of argillite are specific similarities. Mercer says nothing whatever of the weathering of these objects. We do not know the exact mode of occurrence of these objects, whether this is a camp site or natural deposit, and the geological relations of the site are unknown. While the resemblances are strong, nevertheless it would be rash to assume that these necessarily refer to the Trenton argillite culture.

The Masonville and Medford sites are near Rancocas Creek, fifteen or

<sup>1</sup> Skinner, (a), 55.

<sup>2</sup> Mercer, (b), 70-85.

twenty miles south of Trenton. Hawkes and Linton found Lenapé remains in the surface layer of black soil (six inches to one foot deep) overlying yellow sand (three to six feet deep) in which were older remains with a well-marked level of occupation at its junction with an underlying white sand. These remains consisted of chipped celts, hoes, hand hammers, small cylindrical stones, large blades, knives, ceremonial points, small projectile points, drills, banner stones, crude pottery, bones and fire-pits at the surface of the white sand. The material used was argillite or a stone of similar appearance, which had undergone considerable weathering. The yellow sand was deposited subsequent to most of these objects either by wind or water.<sup>1</sup>

While the blades and arrow points have a suggestive similarity in form and patina to the Trenton specimens, nevertheless, the Masonville-Medford culture contains chipped celts, drills, banner stones, and pottery, none of which occur at Trenton. The cultural difference is rather great. The geological positions of the Masonville, Medford, and Trenton sites have never been fully determined. All three are mapped with the Cape May deposits, but this means very little as all deposits not distinctly glacial or palpably recent are classed with this formation. I believe that my earlier objections to considering the Masonville culture as closely related to the Trenton culture holds for the Medford finds as well.<sup>2</sup>

Dr. Abbott and others have told me of similar deep finds near Rancocas Creek which bore a distinct resemblance to the Trenton finds. Dr. Hawkes refers to such material in local collections and especially to a site near Indian Mills.

This survey of finds in the neighborhood of Trenton leaves one distinct impression; that the subject is not a simple one. First, the argillite culture is characterized by a paucity of traits: these traits are the most generalized and therefore most likely to turn up in other cultures. Second, the Lenapé themselves used many implements which are practically indistinguishable from the Trenton finds both in form and patina. Inasmuch as the argillite implements lie only a few inches below the surface it is not unlikely that they have been repeatedly washed out and used by the Lenapé or we may find them among Lenapé remains simply because the plow has inextricably mixed the two cultures. For instance, the presence of similar objects at Plainfield and Staten Island<sup>3</sup> may be explained by the historic fact that the Trenton group of Lenapé had villages at all three places. Third, a fair amount of enterprise has succeeded in bringing to light several stratified sites. We do not know what cultures the region may contain. Therefore, it seems rash to align any of these finds with those at Trenton at present.

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<sup>1</sup> Hawkes and Linton, (a) and (b).

<sup>2</sup> Spier, (d): cf. Linton.

<sup>3</sup> See Lewis, for objects from Staten Island.



## RÉSUMÉ.

Of the three alleged superposed cultures at Trenton, that of the Delaware Indians, the "argillite culture," and the "paleolithic culture," the proofs for the intermediate horizon are subjected to a new analysis. This cultural deposit is found to extend in a narrow area along the river bluffs, being distributed through a sand stratum in a single plane of maximum distribution around which the finds occur according to a normal frequency distribution. These artifacts have a differential mode of occurrence; their center of gravity being above the modal plane. Pebbles of undoubted natural deposition occur with the artifacts, having the same dispersion and with distributional maxima coincident. Films of red clay which traverse the sand may be of secondary origin, not indicating separate strata but stages of the ground water level. The coincident occurrence of artifacts and pebbles indicate that a single depositing agent has acted on the entire sand deposit.

A comparison with deposits of known origin shows a general dissimilarity with artificial culture deposits but an identity with a water deposit. Such an origin for the Trenton "argillite culture" implies some antiquity.

The culture is simple, especially in contrast with that of the historic Delaware; the remains including only large stone blades and arrow-heads, the pitless hammerstone, the rubbing-stone, and fire-fractured pebbles. Most of the objects are considerably weathered. Remains of two human adolescents were also found.

Culture deposits in other localities with definite associations with the "argillite culture" have not been found. It remains an isolated find.

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**AN ANCIENT VILLAGE SITE OF THE SHINNECOCK INDIANS**

**BY**

**M. R. HARRINGTON**



**NEW YORK**  
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## INTRODUCTION

The investigation described in this paper, carried on under the auspices of the American Museum of Natural History during the summer of 1902, was probably the first attempt to study in detail any of the aboriginal village sites on the eastern end of Long Island, New York, although considerable work of a more general nature had been done before by Tooker<sup>1</sup> and others. In fact, so far as the writer knows, it is the only study of the sort on record to date, the only other publication dealing with actual explorations in this district being a description of the excavation of a Montauk cemetery of the Colonial period<sup>2</sup> and not of a village site.

Assisting the writer were Mr. Arthur C. Parker, now State Archæologist of New York, and Mr. Alanson Skinner, now Curator of Anthropology at the Milwaukee Public Museum. It is interesting to note that this was Mr. Skinner's first expedition and Mr. Parker's second.

The expenses of the first part of the expedition were borne by Mrs. Esther Hermann; but after this fund had become exhausted, Mr. William Weiss of Southampton, New York, assisted us to carry on the work another month; and to both of these patrons the thanks of the Museum are due.

A brief résumé of our results was published in the *Southern Workman* for June, 1903. The work received passing newspaper notice at the time, and in due course a detailed report was made to the Museum. It was not, however, until more than nineteen years had elapsed since our party folded its tents and closed its notebooks for the last time on Shinnecock Hills that the opportunity arrived for the writer to revise his report for publication.

The results of his efforts will be found in the following pages, in which the writer will describe the site, the method of excavation, and the phenomena encountered during the course of the digging. An endeavor will then be made to reconstruct, as nearly as can be done with the scant data which still remain, the material side of the life of the Indians who inhabited this village, and to give a glimpse of their arts and crafts, their dwellings, and the means by which they gained their livelihood.

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<sup>1</sup>Tooker, William Wallace. "Some Indian Fishing Stations upon Long Island" (*The Algonquian Series*, New York, 1901).

<sup>2</sup>Saville, Foster H., "A Montauk Cemetery at Easthampton, Long Island" (*Indian Notes and Monographs, Museum of the American Indian, Heye Foundation*, Vol. II, No. 3, New York, 1920).

Fortunately, we are not obliged to depend solely upon the specimens found buried in the earth for our information, although these furnish the bulk of it; for we discovered a few articles of native style still in the hands of the mixed-blood descendants of the Shinnecock Indians who inhabited a nearby settlement at the time of our visit. From these and some of the older whites in the neighborhood was secured considerable information of interest. A knowledge of other tribes of similar culture was found helpful in the interpretation of some of our finds, as were the old records of the town of Southampton, and the accounts of early travelers who met the Long Island and neighboring Indians in their pristine state. These last will be employed by reference only, as Skinner has made full use of them in his accounts,<sup>1</sup> of the Indians about New York City, published by this Museum. Our justification for using the modern Shinnecock artifacts in connection with those exhumed from the ancient village, implying that these also are of Shinnecock origin, will appear later.

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<sup>1</sup>Skinner, Alanson, "The Lenapé Indians of Staten Island" (this series, vol. 3, New York, 1900); "The Indians of Manhattan Island and Vicinity" (*Guide Leaflet Series No. 41, American Museum of Natural History*, New York, 1915).

### THE SITE AND ITS SURROUNDINGS

Far out, toward the extreme end of Long Island, some eighty miles eastward from New York City, lie the Shinnecock Hills, a rolling sandy tract, almost treeless, but covered with bay and thorn bushes and dotted with little swamps where taller underbrush and even small trees may be seen, rising from a tangle of wild grape vines and wild roses, the blossoms of the former, even more than the latter, filling the air with perfume in late spring and early summer.

The Hills occupy the narrow neck of land between Peconic and Shinnecock bays, the former an arm of Long Island Sound, the latter separated from the Atlantic only by a narrow barrier beach of sand. To the east, the country becomes more level and fertile, and on the Peconic side was still heavily wooded at the time of our visit. On the Atlantic side lies the town of Southampton, even then a popular resort in summer. To the west of Shinnecock Hills the isthmus becomes even narrower, until at Canoe Place but a comparatively few yards of sand divided the waters of Peconic Bay from those of the bay to the south, and consequently, of the Atlantic. Here the Indians had a portage,<sup>1</sup> over which they could drag their canoes a short distance overland from the Atlantic into Long Island Sound by way of Peconic Bay, without being obliged to brave the rough waters in rounding Montauk Point, the extreme eastern tip of the Island, and thereby saving some seventy or eighty miles of distance out and back. The whites also were not slow in appreciating the strategic advantage of the spot with the result that the State has constructed a canal on the site of the old Indian portage for the benefit of local fishermen.

This short cut must have played a considerable part in making the region attractive to the Indian, supplementing its natural advantages of good springs of water, proximity to the ocean and to nearly land-locked bays furnishing the best of fishing and numerous clams and oysters, a nearby forest which must have abounded in game, and convenient fertile tracts suitable for cultivation. In fact, numerous traces of ancient habitation may be seen on every hand, especially on the northern side, where the hills are lower, along the shores and coves of Peconic Bay.

*The Site.* The largest of these sites, the scene of our investigations, lies along the west bank of Sebonac Creek, which, rising in a series of springs in a little swamp about three-quarters of a mile north of the Shinnecock Hills Golf Club, flows northward for some distance as a fresh

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<sup>1</sup>Tooker, *op. cit.*, 41.



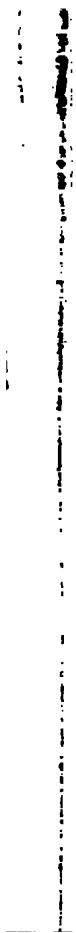
water brook. Before long, however, it becomes a tidal creek which in turn broadens out into Bull Head Bay, an arm of Peconic Bay. Scattered along the entire distance from the springs to the bay might be seen patches of decaying oyster and clam shells of varying area and depth, sometimes but a few yards in diameter, sometimes quite extensive. For the most part, these showed on the surface in the form of small fragments of shell only visible to the practised eye among the thin grass and straggling bushes.

To the casual observer such deposits of shells appear to have been laid down on the sea bottom at some time when the present dry land was submerged; in fact, the writer has often been asked if such could not be the case. Upon his reply that the shells were left by the Indians, the questioner almost invariably inquires, "What was their object?" and is usually greatly astonished to learn how simple is the answer: that the aborigines, after gathering the oysters and clams, and bringing them to their village, merely ate them and threw the shells away, and that these shells, accumulating through the years, formed the deposits that have endured until this day.

Ten of these "shell-heaps" were counted on this site, large enough to warrant the conclusion that each represented not one, but a group of ancient habitations, besides smaller ones which probably marked the site of solitary wigwams. They were lettered consecutively on our map as, A, B, C, etc., beginning at the springs and proceeding northward. This map (Fig. 1) shows only five of the shell deposits, however,—those wholly or partially explored—the others lie to the northward, outside of the area represented.



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## THE EXCAVATIONS

*Method of Investigation.* Our first procedure in examining one of these deposits was to dig in various parts of it small excavations called test holes, each some eighteen or twenty inches in diameter, penetrating through the shells and other materials composing the "village layer" down to the original undisturbed soil of the site. By "village layer" is meant the accumulated refuse of the Indian village, not only the shells, but the soil blackened by the decay of organic matter, stones shattered and cracked by the heat of ancient campfires, charcoal, ashes, the bones of food animals split for marrow, fragments of broken earthen pots, chips of flint and other refuse from the making of stone implements, and occasional perfect objects of Indian make, lost by accident or hidden for safe-keeping.

By these test holes then, we determined the depth and richness of a deposit, and could then decide what part or parts, if any, warranted more thorough excavation. Should such a place be found the next step was to locate the edge of the deposit and there start a trench running down through the village layer, three or four inches into the undisturbed sand below, and wide enough to allow six feet to each worker. A trench of this kind was carried forward by carefully digging down the front with a trowel, searching the soil for relics, then, with a shovel, throwing the loose earth thus accumulated back out of the way into the part already dug over, so as to expose a new front. Test holes two or three feet deep were sunk into the sand here and there and the digging-down process repeated until the opposite side of the deposit was reached and the indications disappeared. Then another trench was run parallel and adjacent to the first on its richest side, and so on, until the investigator was satisfied that he had covered the entire deposit, or at least as much as his purpose required.

*Pits.* The object of digging the trenches not merely to the bottom of the village layer, but several inches below it, and of driving test holes, was to detect disturbances running down into the subsoil from the bottom of the deposit. Such disturbances may be very difficult to follow, showing merely slight stains and bits of charcoal running down into the ground; but they indicate that the subsoil at that point had at some distant date been dug out and filled in again. It is incumbent on the archæologist to find out why, if he can, and to this end he must dig them out to the very bottom.

This frequently leads him to a skeleton, but still more frequently the disturbance turns out to be merely a pit, a bowl-shaped or cup-shaped

hole, dug for one of several purposes, and later used as a repository for ashes and camp refuse that were thus disposed of neatly and easily. One of the purposes for which they were dug was for the storage of corn over the winter. Probably many of the larger pits were thus first employed, but the majority seem to have been ovens or steaming holes, the Indian prototype of the fireless cooker, and direct progenitor of the modern clambake. As nearly as can be discovered, these holes were lined with stones and a fire built in them which was kept up until hole and stones were piping hot. Then the oysters, clams, meat, or whatever food had to be cooked, were put inside and carefully covered so as to retain the heat, and left until done. Some seem to have been used as cookers, without the addition of stones; others, to have been dug purely and simply for the disposal of odoriferous garbage. The examples described on the following pages illustrate typical forms and sizes.

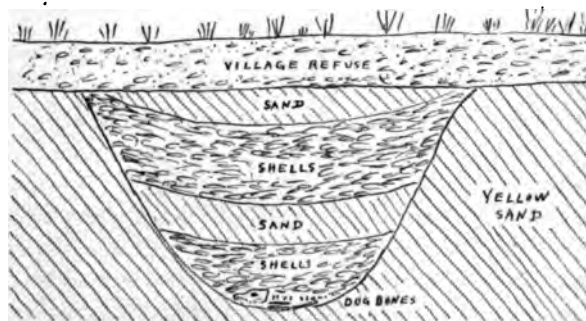


Fig. 2. Section of Pit 62 in Shell-heap A.

*Shell-heap A.* The first shell-heap examined, designated on our map (Fig. 1) by the letter A, was situated near the little swamp whose springs constitute the source of Sebonac Creek. Numerous test holes dug in different parts revealed the fact that the village layer was shallow, averaging about a foot in depth, and that its groundplan was oval, with a length of 110 feet and a width of about 30 feet. Our tests, although failing to yield prospects good enough to warrant trenching, disclosed one rather unusual pit, about 4 feet wide and 3 feet deep, filled with alternate layers of shells and sand as shown in the section (Fig. 2) and containing disjointed dog bones at the very bottom. Scattered through the other layers were several arrow points and unfinished implements of quartz, two broken bone awls, a piece of deer antler, and numerous animal bones, for the most part split for the marrow, as usual.

*Shell-heap B.* Shell-heap B was much larger, some 200 feet long by 100 feet wide, although no deeper than Shell-heap A. It proved to be so much richer that we dug no less than twelve trenches, uncovering twenty-eight pits. Among the most interesting of these was Pit 10, which was found to be 53 inches long, 47 inches wide, and 47 inches deep, and contained, besides the usual shells, deer and fish bones, broken pottery, and bone awls, two burned layers, one directly upon the bottom, one six inches above, yielding charred hickory nuts, acorns, bits of rushes and wood, and most interesting of all, charred cord and bits of aboriginal fabric, made of some coarse vegetal fiber (Fig. 3). Another notable pit was No. 28 which was 6 feet in diameter and 4½ feet deep, with a layer of burned shells and ashes in the center. This pit yielded a number of bone awls and worked pieces of antler, an antler arrow point, many fragments of pottery and an unusual number of bones of various animals, birds, and fish, together with a small deposit of still recognizable fish scales in the very bottom. Pit 40 contained, among other objects, thirteen scrapers of quartz and Pit 47, a large mortar stone with two grinding cavities, one on each side.

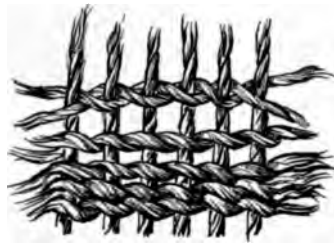


Fig. 3 (20-7472). Piece of Aboriginal Textile.

An unexpected find appeared in Pit 43, which, although but 3 feet wide and 22 inches deep, contained, at 16 inches, the dismembered skeleton of a person some twenty years of age, among whose bones, some of them slightly charred, lay a few bones of an infant. Many potsherds appeared in this pit, some of them lying directly upon the skull. Beneath the bones were found more broken pottery and a number of the bony plates or scales of a large sturgeon. The charring of toes, ankles, pelvis, and ribs suggest that the poor unfortunate may have met death at the stake.

Most instructive of all, however, was Pit 48 which, in spite of its small size (3 feet in diameter and 28 inches deep), yielded an excellent series of specimens illustrating the making of pottery. A lump of unworked clay and some tempered clay lay in the bottom of the pit, while immediately above, fragments of the major portion of a large jar were found. Among the refuse of the pit, which was largely filled with shells of the soft clam, were found two stone pottery smoothers with the clay still adhering (Fig. 4a), a bone awl that could have been used to draw the incised designs on a vessel while still soft, a stone muller, probably

intended to crush the clay or the tempering materials, probably both, and preserved by accidental burning a small vessel in the course of manufacture showing the coiling process distinctly (Fig. 6).

Among the many arrow-heads, potsherds, and other specimens turned out in the general digging here, one object holds a peculiar interest. It is the perforated circular ornament of claystone shown in Fig. 8, engraved on one side with a figure which suggests the head of a bird (a), on the other, with a design which seems to represent an eye, of which the central perforation forms the pupil (b).

*Shell-heap C.* Situated some 100 feet northeast of Shell-heap B lies Shell-heap C, very similar in form to A, but a little larger and a little deeper, averaging 14 inches, as two trenches and a number of test holes showed. A few pits were found here, one of which, a small one, contained a flat pebble, bearing scratched upon it a rude sketch of the face of some animal resembling a lynx (Fig. 7). Much of the ordinary material was found in the general digging, scattered through the whole deposit.

*Shell-heap D.* On a rise of ground some distance north of the preceding was situated Shell-heap D, which, like it, was of rather small dimensions. It was shallower, measuring only 8 inches, and contained but two pits worthy of the name, one of the common form and contents, the other, Pit 64, more cup-shaped than bowl-shaped, with sides nearly perpendicular. This contained, besides the common bones and sherds, a lynx jaw, a raccoon jaw, and a piece of antler showing cutting.

*Shell-heap E.* Just east of D, lay Shell-heap E, large and irregular in outline and variable as to depth. This shell-heap was chiefly remarkable because it contained two wigwam sites distinguishable as such, the first the writer had seen in all his three years' archæological digging about New York.

*Wigwam Sites.* The first wigwam site was an oval of stained earth about 15 feet wide by 20 feet long, and in the center, where the fireplace seems to have been, reaching a depth of 3 feet. The average depth of the floor, however, was some 27 inches. Here were unearthed two massive pieces of a whale's lower jaw bone, still showing at the ends the marks of the stone ax with which it had been cut into lengths (Fig. 5), for what purpose was not evident. Scattered about through the deposit were many pieces of a small pottery vessel, bone awls, and pieces of deer antler showing cutting, besides the ordinary animal bones, flint chips, and the like. Shells and charcoal, while present, were by no means abundant.

Of considerably smaller size was the second wigwam site, which lay about ten feet southeast from the first, for it measured only 10 feet by

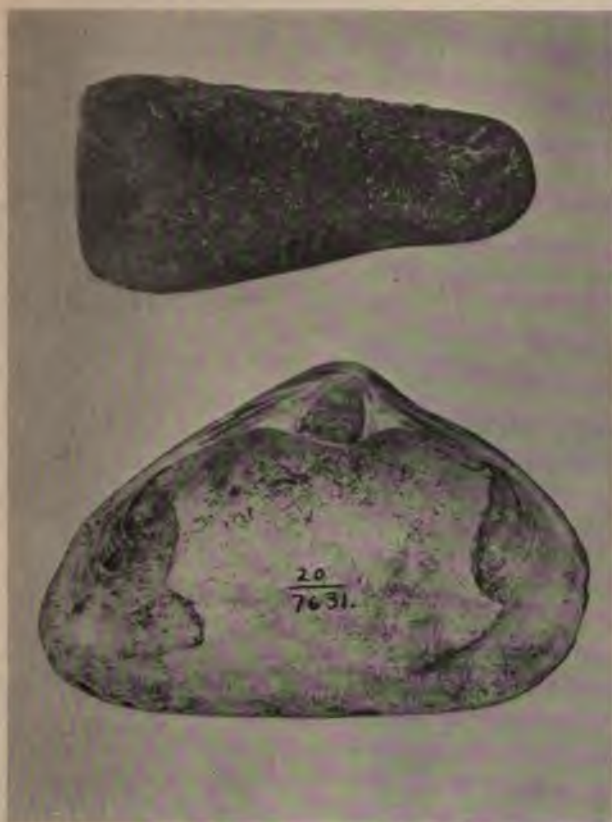


Fig. 4 *ab* (20-7762, 7631). Implements for making Pottery.



Fig. 5 (20-7918). Piece of Whale's Jawbone showing Marks of the Stone Ax.





Fig. 6.



Fig. 7.



*a*



*b*

Fig. 8.

Fig. 6 *a'*, *a* (20-7846, 7774). Part of Pottery Vessel showing Coiling and a Piece of a Clay Coil.

Fig. 7 (20-7627). Pebble showing Drawing of an Animal's Face.

Fig. 8 *ab* (20-7660). Obverse and Reverse of a Clay Stone Pendant showing Designs possibly representing a Bird Head and an Eye, respectively.

15 feet. In the center, where the fireplace had been, was a distinct spot of burned earth, and a deposit of ashes, a little over 2 feet below the present surface. This wigwam site, like the first, was thoroughly excavated, but yielded only the commonest of pottery fragments and split animal bones.

*Burial.* But a few feet east of the first wigwam site, in Pit 54, a typical burial came to light, the first and only one entirely in anatomical order found on the site. It was the skeleton of an aged person lying flexed on its right side with the head to the southwest, face turned toward the east, and hands near the face (Fig. 9). The only unusual feature was the sunken position of the hips, fully two feet deep, while the head was 14 inches and the feet but 12 inches from the surface. Near the pelvis were two worked stones and a large part of a bowl made from the shell of a box tortoise (Fig. 10). Above and a little south of the knees was a small bed of ashes. Throughout the grave were scattered disintegrating oyster shells, while the skeleton itself was badly decayed.

*Copper Bead.* This grave had cut into a pit (No. 55) which contained merely the ordinary animal bones and bits of broken pottery, in which respect it resembled several other pits that were opened in the vicinity. A rare article, however, appeared in the northern part of this shell-heap in the general digging, a cylindrical copper bead (Fig. 11), apparently made of the native metal; but without analysis this cannot be stated as a positive fact.



Fig. 11 (20-8026). Copper or Brass Bead.

*Shell-heap F.* North of Shell-heap E was a small fresh-water pond which became nearly dry in summer. North of the pond Shell-heap F extended down to the swampy ground surrounding the pond and the adjacent salt meadows. The swamp itself was full of shells in a number of places. This was the largest deposit of all, for it extended almost continuously from the little pond in a northerly direction around the western side of what we called the Spring Knoll a distance of five or six hundred feet, and was in places more than a hundred feet wide. The little work we were able to accomplish here in the brief time that remained to us was productive of excellent results, however, for the second pit (No. 59) yielded a nearly perfect pottery vessel of the pointed-bottom variety (Fig. 12), a long bone awl, and a beaver tooth, besides the usual material. This pit was oval in groundplan, measuring  $4\frac{1}{2}$  feet by 6 feet, with a depth of 28 inches. The construction, as may be seen

in the section (Fig. 13), was rather out of the ordinary, in that the pit had been filled with raw unstained material such as forms the subsoil in the vicinity, thus producing a yellow layer above the shells and blackened earth of the pit. Such pits illustrate the wisdom of digging occasional test holes into the apparently undisturbed subsoil.

This was in the first trench; further trenching brought to light many small pit-like depressions, as well as ash-covered beds of fire-broken stones, all in or below a village layer which averaged about 10 inches deep. This yielded some very good bone awls, many potsherds and the ordinary material. At one place two points of deer antler and a bone awl were found in contact, lying on the original subsoil upon which the shell-heap rests.

*Other Deposits.* The shell-heaps to the northward toward Peconic Bay, and there were quite a number, were not touched for lack of time.

*The Spring Knoll.* Between Shell-heap F and Sebonac Creek, at this point expanding into a good-sized salt water cove, is situated the Spring Knoll, one of the most interesting parts of the whole village site. Toward the water, it terminates in a steep cutbank about 10 feet high, extending down to the edge of the creek, where a clear cold spring bubbles forth, while on the land side, beyond the shell-heap, the knoll blends with the brambly, wind-swept Shinnecock Hills. On this knoll, not far from the spring, the explorer's camp was pitched.

*Graves.* Just south of the crest of the knoll, test holes in one spot revealed dark stains penetrating the yellow sand, with here and there a scattered shell—a likely looking prospect for a grave. We followed these stains, of course, with the result that we soon traced the outline of a pit (No. 11) some five feet in diameter, and shortly afterward, at a depth of 28 inches, encountered the decayed bones of four infants matted together in a compact mass. The pit ran down to a depth of 38 inches and yielded, besides these remains and a few scattered bones of an adult, several fragments of pipes, both earthen and steatite, one of the latter engraved, and the usual sherds, including some fragments of steatite vessels, together with split deer bones and the like.

Pit No. 14, another grave, was found about 10 feet southwest of Pit No. 11. It contained the remains of a child aged about twelve, at a depth of 29 inches to the top of the skull. The skeleton headed east, and lay partly on the stomach with knees northward and feet doubled back to the pelvis. The skull had been displaced and was found facing west near the knees. It was badly cracked and the lower jaw and some of the cervical vertebræ were apparently missing, but were afterwards located

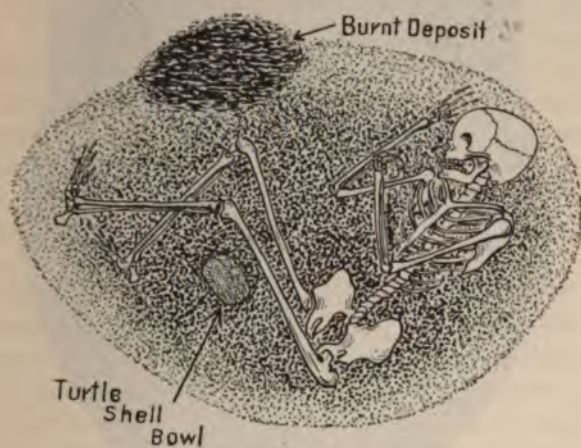


Fig. 9. Sketch of Skeleton in Pit 54.



Fig. 10 (20-7937). Part of Tortoise Shell Bowl.



Fig. 12 (20-7975) Pottery Vessel

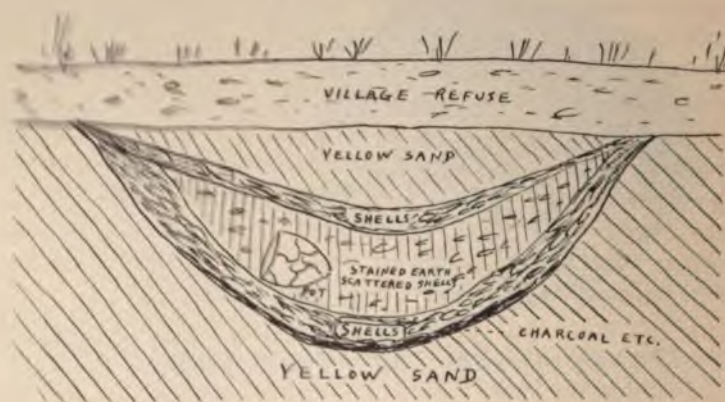


Fig. 13. Section of Pit 59.

near the pelvis. All the other bones were placed naturally. The pit ran down to the depth of 25 inches and contained broken pottery, fish bones, and the like, also a quartz arrow-head.

*Other Pits.* Six feet south of Pit No. 14 was Pit No. 35, of unusually large size, being 7 feet wide and 4½ feet deep, a pit which yielded among other material charred corn and cobs. Four feet south was still another pit (No. 36) about the same size as the last. It was nearer the swamp and reached water. In the bottom, embedded in the saturated sand and ashes lay many potsherds and a broken skull and femur. Both articulating surfaces of the femur and the face of the skull were missing. There were a number of other pits on the knoll, but these were not specially interesting.

*Spring Knoll Village Layer.* North of the summit of the knoll and facing Sebonac Creek is situated a small hollow in which were found many traces of occupation, but few shells. Here a number of trenches brought to light many specimens, among them a perforated clay-stone ornament and a potsherd bearing the engraved figure of a bird, perhaps the mythic "thunderbird" (Fig. 32e). Several pits were exposed here, one of which was Pit No. 1, interesting because it contained near the bottom a large number of land snail shells (*Helix albolabris* and *alternata*) showing the probable use of such snails as food. A section of this pit is shown in Fig. 14.

*Archaic Specimens.* The soil of the hollow is different from that of the other deposits on this site, as the black village layer reaches the depth of twenty inches in places, with but few and scattered shells. Most of the artifacts were found near the bottom, just above the yellow sand which underlies the whole deposit, but in some cases stemmed arrow points and crude crumbling pottery of a somewhat more archaic character than most of the specimens found here were exhumed from the yellow sand itself. It should be noted, in this connection, that the triangular type of arrow point was the most abundant on this village site; not, however, the narrow triangles associated with Iroquois culture, but the broad form affected by the seaboard Algonkian tribes.



## RECONSTRUCTION OF SHINNECOCK CULTURE

Such were the conditions found and such the nature of our excavations. We must now attempt to learn from the specimens exhumed from this ancient village something of the life of its vanished inhabitants, of their means of livelihood, their industries and manufactures, and their relations with other peoples. Only in so far as we may be able to accomplish this will the results of our investigations be of real value. Fortunately, as before mentioned, we have specimens and information gathered from the descendants of this people, old local records, the writings of early travelers, and the surviving practices of similar tribes to help us.

*Site identified as Shinnecock.* With the exception of the few objects characterized above as archaic, found on and near the top of the sandy subsoil underlying the village layer on the Spring Knoll, all the material found was quite uniform and apparently the work of one people. Some articles made by the whites of the Colonial period (Fig. 15) were found near the surface, indicating that whatever the age of its first settlement the village had been occupied up to the coming of the whites. Now the white settlers found the Shinnecock in full possession of the district,<sup>1</sup> so if the last Indians of the village were Shinnecock, and the deposits for the most part contain the handiwork of only one people, we have good reason for assuming that the village was Shinnecock from first to last. As for the archaic articles, somewhat different in character, found in one spot on the Spring Knoll, these appear to be relics of an earlier camp occupied by a people who may or may not have been the ancestors of the Shinnecock.

*Dwellings.* What sort of houses stood on the knolls beside Sebonac Creek three hundred years ago? Our excavations told us little, except that they were of oval groundplan, some as small as ten by fifteen feet, some as large as fifteen by twenty feet; that their floors, sometimes at least, were sunk two or three feet below the surrounding surface of the ground; and finally, that the fireplace was in the middle of the floor.

There seemed to be little hope of finding further data. So when we discovered several living people who had seen Shinnecock wigwams in actual use our surprise and pleasure were great. Some of the informants were aged descendants of the Shinnecock; others were elderly whites who had spent their days in the neighborhood; but all agreed on a description which may be stated as follows:—

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<sup>1</sup>Thompson, Benjamin Franklin. *History of Long Island from its Discovery and Settlement to the Present Time* (Third edition, revised and greatly enlarged, New York, 1918), vol. 1, 127.

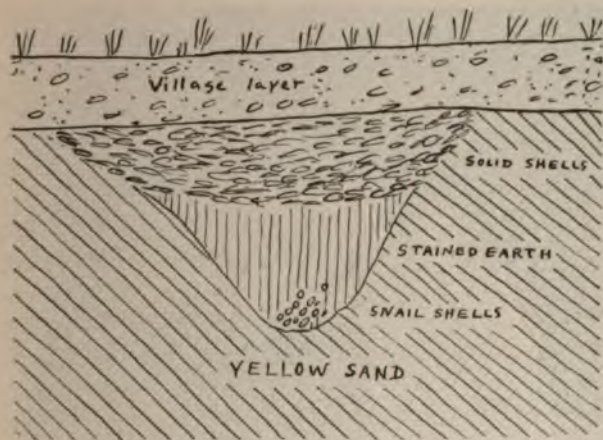


Fig. 14. Section of Pit 1.



Fig. 15 *abc* (20-7319, 7292, 7667). Objects of European Origin.





Fig. 16 (M-34). Model of Shinnecock Wigwam.

Poles were bent into intersecting arches until a dome-shaped frame was made from ten to twenty feet in diameter. After all the poles had been tied firmly together, and horizontal strips put in place, the whole was thatched with a species of grass, called "blue vent," put on in overlapping rows, and sewed fast to the strips. When the top was reached, a hole was left open for the escape of smoke, and the edges of the aperture plastered with clay to prevent the thatch from catching fire. The ground-plan was circular or oval, sometimes divided into rooms by partitions of wattle-work and thatch. The door frame was an arched pole, the door of wood, or sometimes merely a curtain of skin or mats. An elevated bench or couch of poles generally encircled the interior, beneath which the goods were stored. In at least one case, at a place where poles were difficult to procure, the floor was dug out in the middle so as to leave a shelf around the wall which answered the purpose of bed, seat, and table. The fireplace was in the center.

To preserve this information in tangible form, Mr. W. C. Orchard visited the Shinnecock settlement a few months after our party had left, and under the instruction of Wickam Cuffee (Fig. 35), one of the oldest and purest-blooded of the survivors, prepared a model showing the exact method of construction, which may be seen in Fig. 16. We afterward found a photograph of a full-sized Shinnecock wigwam in the records of the town of Southampton.

Outdoor storehouses were still made in the Shinnecock settlement, at the time of our visit, by digging holes four or five feet deep and roofing them with poles and thatch. One of these may be seen behind the Indian in the photograph reproduced in Fig. 38. That this is an ancient method may be established from Colonial records,<sup>1</sup> which mention the "Indian barns" as constituting a danger to the Colonist's cattle, on account of the excavations into which they might fall.

It is, of course, quite possible that the "holes" that gave the good people of Southampton such trouble in 1641 were merely abandoned storage pits that had never been roofed.

*Means of Livelihood.* A glance at the thousands of rotting shells which compose the bulk of the deposits gives an immediate clue to the outstanding fact of ancient Shinnecock economics: that the sea furnished the greater part of their living. We must not rest content with the idea that oysters, hard clams, soft clams, and scallops constituted the whole of the ocean's contribution, for the refuse layers and pits yielded crum-

<sup>1</sup>Pelletreau, William S., "The First Book of Records of the Town of Southampton with Other Ancient Documents of Historic Value" (Transcribed with Notes and Introduction, Sag Harbor, New York, 1874), 22.



*a*



*b*



*c*



*d*

Fig. 17 *a-d* (20-7634, 8000, 7736, 7811). Stone Implements.

bling bony plates once forming the armor of huge sturgeons, while the teeth of sharks, the bones, and sometimes the scales of other fish, most of them beyond precise identification, together with the claws of crabs, show that the Shinnecock made good use of all the edible creatures the local waters afforded.

As to the method of taking fish, the shell-heaps yielded a few suggestions, among which was the presence of numerous flat pebbles, notched at the edges (Fig. 17a) as if to keep an encircling cord from slipping off. Similar stones may be seen in use as net-sinkers among some tribes today. Such a use for the objects in question is made more probable by historical data referring to the use of nets by nearby peoples.<sup>1</sup> A part of an antler fish hook (Fig. 18a) which, when perfect, probably resembled the bone hook found by Tooker (Fig. 18b), and a slender pointed bone object, so shaped as to suggest its use as a barb for a fish-spear (Fig. 18c), hint at other possible methods, as does the survival, among the neighboring mixed-bloods of today, of fish traps made of basketry of a style once used by most of the tribes of what are now the central Atlantic States.

We cannot go so far as to state that these Indians actually hunted the whale, although fragments of a barbed antler harpoon head hint at such a possibility. Worked bones of one of these great creatures found in one of the wigwam sites show that they used the whale, whether they harpooned him on the high seas or found him dead on the beach.

Colonial records lead one to believe that they did both, for we find in a deed of April 29, 1648<sup>2</sup> that the Shinnecock, in selling a certain tract retained their hunting and fishing rights, and were to have the "ffynnes and tayles of all such Whales as shall be cast up" on the adjoining

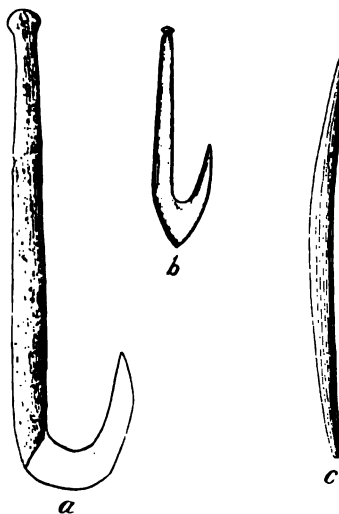


Fig. 18 a and c (20-7471, 7518), b (Tooker Collection). Fish Hooks and Barbs. a, Part of antler fish hook; b, Bone fish hook; c, Bone barb.

<sup>1</sup>Vander Donck, Adriaen, "A Description of the New Netherlands" (Translated from the original Dutch by Hon. Jeremiah Johnson, Collections, New York Historical Society, 2d series, vol. 1, New York, 1841), 209.

<sup>2</sup>Thompson. *op. cit.*, vol. 2, 87.

beaches; while an ordinance of October 7, 1672<sup>1</sup> "ordered that no Indian employed in the whaling business shall have more than one trucker coat for each whale that his company shall kill, or half the blubber, without the whalebone." Certainly, if Shinnecock "engaged in the whaling business" and their "companies killed whales" only thirty-two years after the coming of the whites, the presumption is strong that they did it before the Colonists arrived, about 1640.

The records of the 1670's are full of contracts in which various Indians agreed to go to sea for certain colonists in pursuit of whales "and other great fish," promised to "use and improve our best skill and strength and utmost endeavor for killing" them, and avowed their intention of taking the best of care of boats and tackle, all for a certain stated payment; with a penalty of so much a day to pay for absence without good excuse.

Certain it is also that in later historic times many Shinnecock shipped as whalers out of Sag Harbor and their seagoing instinct is demonstrated by the tragic fate of twenty-eight of the men, including a large proportion of the full-bloods, who perished while trying to save the stranded ship *Circassian* as late as December 31, 1876.

Although so large a proportion of their food supply came from the sea, quantities of deer bones split for the marrow show that the Shinnecock by no means despised the venison that formed the staple food of so many tribes, while other bones taken from the shell-heaps and pits show that the flesh of the raccoon, muskrat, and even perhaps the lynx, was not neglected, and that due advantage was taken of the spring and fall migrations of wild fowl. Bits of bony carapaces extracted from among the shells of the middens tell of the use of various kinds of turtles as food, and deposits of the shells of land snails would seem to indicate that the primitive Long Islanders were not unfamiliar with that popular French dainty.

The finding of numerous arrow points of stone and of deer antler amid the village refuse and of bones showing wounds, probably made by such points, indicates that shooting with the bow and arrow must have been one of the methods for taking game. All knowledge of other appliances, whether weapons, traps, or snares is now lost. By analogy with styles used by most Eastern tribes, we may surmise that the Shinnecock bow was probably straight, five feet or even more in length, with a rectangular section; and that the arrows were also long, at least thirty inches, and were provided with three feathers. The modern Shinnecock

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mixed-bloods told the writer that their bow was of hickory, "as long as the man who used it."

The products of agriculture are highly perishable, so it is not surprising that so few cobs and grains of corn or maize appeared in our deposits. The astonishing thing is that some did happen to fall in the fire to be preserved by charring for our instruction hundreds of years later. It is certain, from our knowledge of other eastern tribes, that the raising of corn, beans, and squashes must have been of considerable importance to Shinnecock diet; certainly more than the bare handful of charred cobs and grains would lead us to expect.

Most, if not all, Indian tribes took full advantage of such natural products as their environment afforded in the way of roots, nuts, and berries. The finding of charred hickory nuts leads us to surmise that the Shinnecock were no exception to this general rule. A rather pathetic bit of corroborative evidence appears in the Southampton records<sup>1</sup> where we find that:—

At a general court held March 6, 1654, it was ordered that noe Indian shall digg for ground nuts on the plain nor in any other ground, upon penalty of sitting in ye stocks for ye first fault, and for the second to be whipped.

*Cookery.* To describe the cookery of a people after several hundred years have elapsed is no easy task, and cannot, of course, be done in detail. Yet, we are not altogether without clues, for our shell-heaps yielded many potsherds, and a few fragments of steatite vessels, some still so coated with deposits of soot or similar material that we can safely say that liquid foods were boiled in earthen kettles with pointed bottoms, or in oval or rectangular kettles of soapstone provided with handles at the ends, both set directly over the fire. But how could a vessel with pointed bottom be made to stand while the contents was cooking? Such a question naturally suggests itself, but is answered for us by John White of the Roanoke Colony of Virginia, 1585–1588, who made a drawing of a kettle of this type in use, supported by the sticks of firewood, and captioned it "The seething of their meate in Potts of earth."<sup>2</sup> Other tribes who have used pointed-bottom "potts" in recent years frequently support them with three or four stones, between which the point is set.<sup>3</sup>

Now, the question arises as to just what sorts of food were cooked in these vessels. The boiling of meat in the form of soups or stews is suggested by the numerous bones of deer and other animals, which, although

<sup>1</sup>*Idem*, 152.

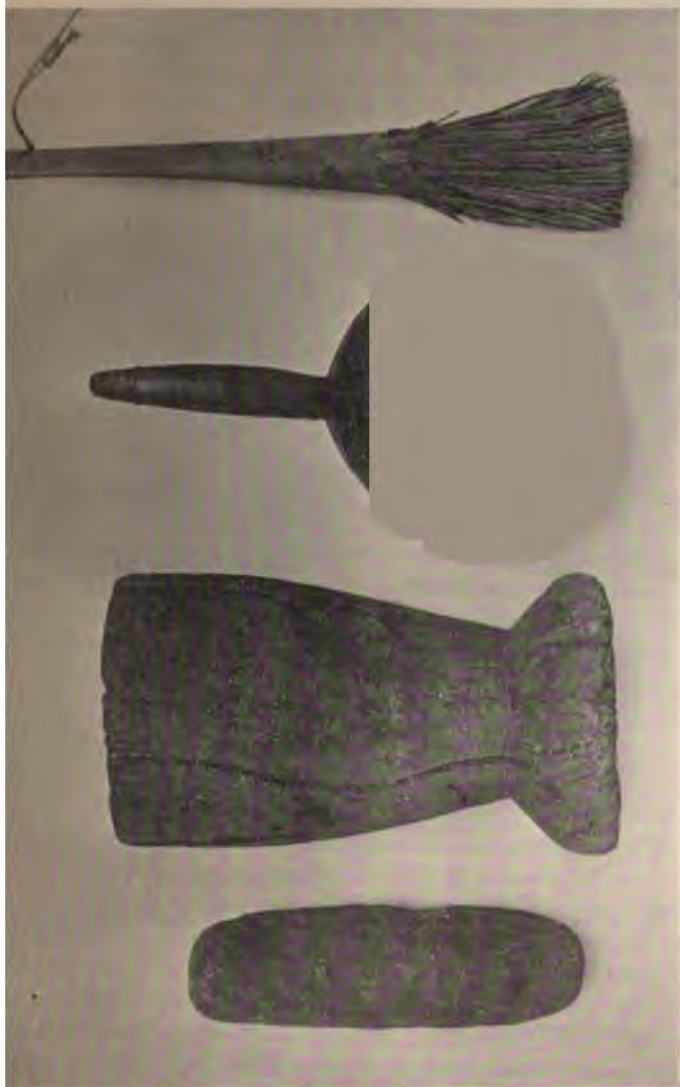
<sup>2</sup>Holmes, W. H., "Aboriginal Pottery of the Eastern United States" (*Twentieth Annual Report, Bureau of American Ethnology*, Washington, 1903), pl. II.

<sup>3</sup>Skinner, Alanson, "Notes on the Bribri of Costa Rica" (*Indian Notes and Monographs, Museum of the American Indian, Heye Foundation*, vol. 6, no. 3, New York, 1920), 49.

split for the marrow fat, considered by most surviving Indians as a great dainty, show no trace of burning or contact with fire at the ends, and so were probably boiled. That some meat at least was roasted or broiled is suggested by the fact that some bones *do* show such burning. The very fact that the burning is mainly confined to the ends indicates that the middle portions were covered with meat at the time of exposure to fire. Tradition among the surviving mixed-blood Shinnecock tells us also that the old people made hominy and "suppawn" or mush from corn, both of which required boiling. Also, that they boiled corn with ashes to remove the hull, washed it free of lye, pounded it in a wooden mortar with a long stone pestle, mixed the resulting meal with berries or beans, according to the season, and finally boiled it in the form of dumplings. Such boiling, in ancient times, meant, of course, the use of the clay or stone pot.

An inspection of the thousands of oyster and clam shells lying about the village site revealed the fact that few, if any, showed any traces of forcible opening, yet seldom were the two valves found together. Comparatively few of them showed traces of fire, so we cannot conclude that they were usually opened by laying them on glowing coals. From these facts, it appears that most of them must have been steamed open, which could best be done in the oven pits of which we found so many examples. From the phenomena we observed in our digging, plus our knowledge of the use of such primitive fireless cookers by other tribes, the method of procedure must have been somewhat as follows: A bowl-shaped hole was dug four or five feet in diameter and two or three feet deep, in which a layer of stones was placed. On these, a good fire was kindled which was kept burning until the stones and the hole itself were piping hot. Then a layer of seaweed was laid in, upon which the shellfish were placed, together with meat or fish, or whatever else the Indians wished to cook. These were covered with more seaweed and earth drawn over the hole to keep in the steam. When the pit was opened some hours later, the shells were all open and the contents ready to eat. Some such arrangement as this was probably the progenitor of the New England clambake, borrowed from the Indians by the colonists.

We found no utensils especially intended for serving food unless the bowls made from the shells of the land tortoise, of which we unearthed a number of fragments, were so employed. The largest piece (Fig. 10) shows that the rim of the carapace had all been cut away and the rib-like bony structures inside scraped out to fit it for use as a bowl. In common with the Mohegan, the Lenapé, and other Eastern Algonkian tribes, the Shinnecock must have used bowls and spoons of wood; in fact we found



*A* *B* *C* *D*  
 Fig. 19 *a-d* (50-3489b, 3489a 3491, 3494). Modern Shinnecock Implements.





Fig. 20 *a-d* (50-3485, 3483, 3487, 3484). Shinnecock Baskets.

a few of the latter, resembling the butter ladles of the whites, among the surviving Shinnecock mixed-bloods (Fig. 19c) and early accounts<sup>1</sup> tell of bowls and water vessels made of gourds, some as big as a Dutch bushel, used by neighboring tribes.

*Manufactures.* An inspection of our collection shows that the ancient Shinnecock employed, as materials for their manufactures, flinty stones, tough stones, soft stones, deer antler, the bones of various animals, shells, clay for pottery making, vegetal fiber for making textiles and cordage, a little copper, and, of course, wood, although we found no actual wooden articles. Arrow points, however, imply arrows of wood. Arrows required bows of wood and the presence of these suggest that other wooden articles must have been used. Such reasoning is not needed, however, for our inquiries concerning woodwork among the modern Shinnecock mixed-bloods brought a number of facts to light, which are doubtless, in part at least, applicable to the ancient people.

*Use of Wood.* Wooden mortars of two sizes were in general use: one large, about two feet high, used, with a wooden or a long stone pestle, for preparing corn; the other, small, less than a foot high, in which a stone pestle was employed to crush herbs. I failed to obtain any specimens of the first type, but succeeded in buying for the Museum the old herb mortar with its original stone pestle (Fig. 19ab), both handed down for generations in the family of John Thompson. Such mortars were made of sections of the trunk of the pepperidge tree, also called tupelo or sour-gum, the wood of which is noted for its toughness and freedom from splitting. The hollows in the mortars were made by laying on live coals and scraping out the charred portion, renewing the coals until the required depth was reached.

Baskets were made of white oak or maple splints in two principal forms, the one tall and cylindrical (Fig. 20a), the other flat and either circular (Fig. 20b) or rectangular in outline, with low sides. The winnowing basket for preparing corn was of the low-sided type. Fancy baskets (Fig. 20d), into whose composition sweetgrass sometimes entered, were formerly made, but this art has become extinct, the only basket now woven being a cylindrical type with a handle (Fig. 20c) identical with a style commonly made by the whites. The splints were sometimes dyed yellow, it is said, by a decoction of the inner bark of a species of oak. A pack basket, carried on the back by means of a band across the forehead was still in common use sixty or seventy years ago for transporting burdens of all kinds. Eel traps of cylindrical form, with a funnel point-

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<sup>1</sup>Van der Donck, *op. cit.*, 188.

ing inward at one end through which the fish could enter but not escape, were also made from the white oak splints, a widely distributed type.

Serviceable brushes for cleaning pots were made by splitting the end of a white oak stick into small splints as seen in Fig. 19d and large brooms were sometimes made in the same style. Broad flat wooden ladles (Fig. 19c) were common in old times, many of them resembling the butter ladles of the whites.

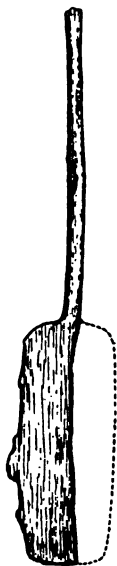


Fig. 21. Ancient Wooden Canoe Paddle. Tooker Collection.

Canoes, it is said, were made of great whitewood or oak logs, hollowed out with the aid of fire, like the wooden mortars. As for paddles, a certain Charles Conklin, while fishing for eels in the creek at Canoe Place, in February, 1880, found the larger part of an ancient oak paddle embedded in the mud. This implement (Fig. 21) measures  $34\frac{1}{4}$  inches long, with a blade which must have originally been at least 8 inches wide. It found its way to the collection of William Wallace Tooker at Sag Harbor, and finally to the Brooklyn Museum.<sup>1</sup>

*Stonework.* The chipped implements of stone found on the site, probably variously used as arrow-heads, spear points, knife blades, and drills, were usually made of white quartz, which exists in abundance in the form of pebbles on the nearby beaches, together with less frequent pebbles of jasper and chert of different colors which were sometimes employed. Argillite was the only exotic material used for chipped implements and this was probably brought in from what is now New Jersey by intertribal trade, already fashioned into implements. The triangular form of arrow point, usually of quartz, as before stated, (Fig. 22a, c), was the predominating type; the stemmed forms were generally, but not always, of other materials (Fig. 22d, e, f). The use of arrow points in hunting has been discussed; that they were also employed in war cannot be doubted. As may be seen from the typical specimens illustrated (Fig. 22) the arrow points of the Shinnecock are rather irregular in form and crude in finish.

Experiment has shown that the average stone knife was most efficient, not for whittling, but in cutting bone or wood when used as a

<sup>1</sup>Thanks are due to Mr. Foster H. Saville for photographs and information concerning this paddle and other objects in the Tooker Collection. The paddle and the fish hook have been published before. See Tooker, *op. cit.*



Fig. 22 *a-i* (20-7960, 7990, 7683a, 7857a, 7300, 7837, 7859, 7605, 7465).  
Chipped Implements and Clay Stone Pendant.



Fig. 23 *a-e* (20-7580, 7580, 7927, 7433, 7544). Objects of Bone and Antler.



saw, a process illustrated by many specimens of bone and antler (Fig. 23d) found on this site which have been sawed around with a stone knife and then broken off. Another use of the stone knife was for grooving bones lengthwise until they were divided into long strips suitable for the manufacture of needles or awls. This process is also illustrated by several specimens, and experiment has shown its practicability. Undoubtedly, stone knives were also employed in skinning animals and in cutting meat.

Few drills were found in our excavations, although objects of stone and bone and fragments of pottery showing drilling were not uncommon. Probably the tip of an arrow-head answered all ordinary purposes, especially as, in almost every case, the drilling was done from both sides of the object to be perforated, making a long drill unnecessary.

Chipped scrapers of different kinds were nearly as numerous as arrow points, the sharply bevelled type (Fig. 22h, i) predominating; quartz was the favorite material, or at least the most used, although a few were made of chert and jasper, and one of argillite. Several had been made of broken points re-chipped to give the necessary bevelled edge. Besides their use, noted among other peoples, for cleaning the flesh side of skins from any bits of fat or meat remaining after the preliminary scraping with larger implements, these scrapers were probably employed for scraping down arrow-shafts in much the same manner as the modern carpenter uses a bit of glass, and for shaping and sharpening bone awls, which sometimes show distinct traces of this process in the form of slight longitudinal grooves which may be reproduced by experiment.

Large flakes, three or four inches in diameter, usually showing on one side the outer surface of the boulder from which they had been struck, were sometimes chipped so as to produce a disk-shaped implement with a rather blunt edge about the periphery, such as is used by several tribes today in softening skins.

The preliminary flaking in the making of chipped implements seems to have been with hammerstones of which we found two types here: one, the natural pebble bruised about the edge by use (Fig. 17c); the other a more or less circular form with a pit in the middle of each flat side for the reception of the thumb and finger (Fig. 17d), the former variety being the most abundant. Such hammerstones were applied directly to the material in removing large flakes, but punch-like cylinders of antler (Fig. 23c) were probably sometimes interposed between the hammerstone and the edge of the blade to be flaked, and the points were finished by removing fine scales from their edges by pressure with a piece of bone or antler. The large number of unfinished implements, pieces rejected for defects, and flakes, testify to the extent of the industry.

The crudest chipped implements found were the so-called choppers, merely beach pebbles of quartz brought to a rough edge at one end by the removal of a few flakes which fitted them for use as a sort of ax for which no handle was necessary. Sometimes such choppers show the wear of considerable service, but it seems probable that most of them were shaped with a few strokes to serve the need of a moment and were then discarded.

Hammerstones were doubtless used for many purposes, but their effects may be best seen today on the unfinished celts that were being slowly shaped by tedious battering and pecking (Fig. 17b). Broken finished specimens showing careful polishing were unearthed, but no complete examples appeared of this grooveless type of ax, which we know, from complete examples found elsewhere, was mortised into a club-like wooden handle. No examples of the grooved ax, whole or broken, came to light during the digging on the site, but it was probably used by the Shinnecock, unless they differed from most Long Island tribes in this respect, while resembling them in many others. Stone axes of either type were useful in breaking firewood at home and the celt type especially for splitting the skulls of enemies while on the warpath, but were not capable of chopping, as we know the term. For felling trees and cutting them into lengths, it was necessary to apply fire, then to use the stone ax to cut away the charcoal and batter loose the fibers so that the fire might take fresh hold, and repeat the process until the work was done. The marks of a stone ax may be seen on the ends of the large bone (Fig. 5), a relic of a whale cut up by the ancient Shinnecock, mentioned before as found in one of the wigwam sites we explored.

Although we failed to find a good example in our digging, there is no doubt that the ancient Shinnecock used the long cylindrical stone pestle, for a number were found still in use among their mixed-blood descendants who all agreed that the implement formed part of their ancient equipment. Such pestles were undoubtedly made by the same battering and pecking process used in the manufacture of stone axes. The long pestles, as before noted, served to grind corn in deep mortars of pepperidge wood; but that these were not the only pattern used is shown by several shallow mortars of stone found in our excavations. Fig. 26 is a good example, consisting of a stone slab with a cup-shaped hollow on one or both sides. Still another type was a flat slab showing traces of rubbing. Instead of a pestle a water-worn beach pebble was used as a muller with the shallow mortars which may have been employed occasionally to grind corn, but probably served mainly for grinding tempering materials and clay

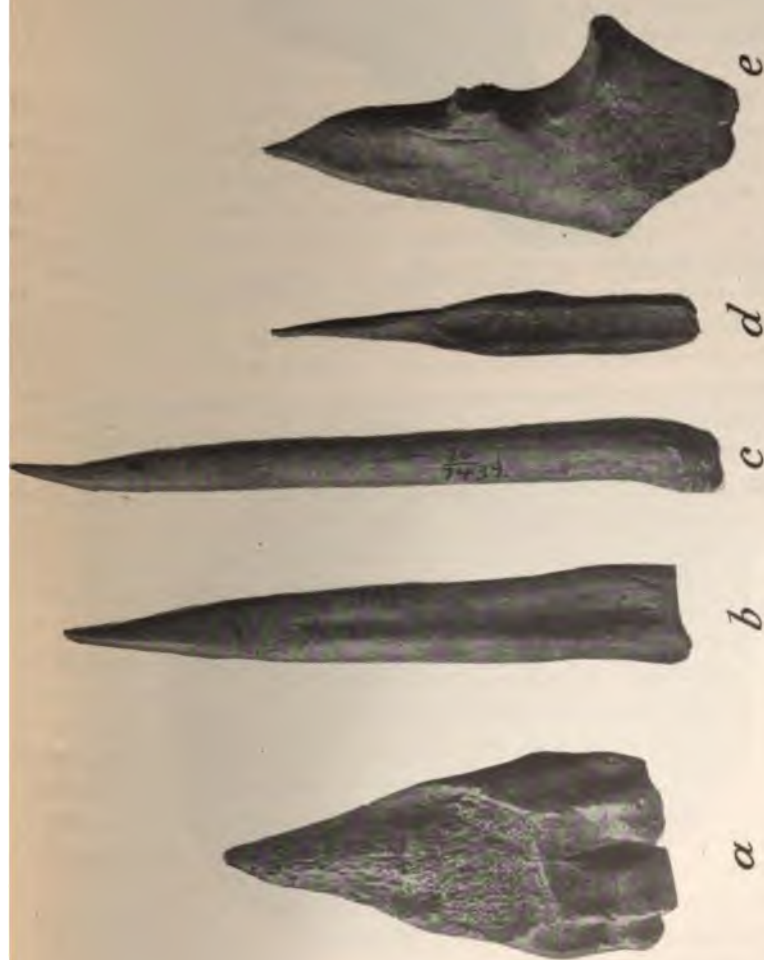


Fig. 24 *a-e* (20-7582, 7535, 7439, 7474, 7622). Bone Awls.





Fig. 25 (20-7492). Fragment of Steatite Vessel showing Handle.



Fig. 26 (20-7757). Stone Mortar.

for pottery making, and for crushing dried meat, dried fish, and dried berries.

We have no reason to suppose that the oval steatite vessels provided with lugs at the ends, of which we found several fragments (Fig. 25), were made by the Shinnecock. These were probably imported ready made from what is now Connecticut, the nearest point where aboriginal soapstone quarries have been found.

A few small fragments of steatite pipes were found which, when perfect, probably resembled the specimen found nearby by Tooker (Fig. 27), a form which required a separate wooden stem. We have no direct data on how they were made, but the soft stone must have been easily cut and drilled with the usual flint knives and perforators.

The circular pendants made from claystone concretions (Fig. 22g, Fig. 8), one perforated near the edge, the other in the center, could be easily reproduced with similar implements, and the crude design scratched in with a flint point. The scratchings on the specimen shown in Fig. 28 must have been similarly made; it seems to be a fragment of a similar pendant, but of elongated form.

*Bone and Antler.* Implements made of bone and deer antler were quite numerous, especially the awls, of which we found several types. The best were made from strips cut from the metapodial bone of the deer, carefully rounded and polished (Fig. 24bc). Others were made from the ulna or other large bones of the deer, with the joint left to serve as a handle (Fig. 24ae), but the majority were merely sharpened splinters of bones that had been split open for the marrow (Fig. 24d). The bones of birds or small mammals were more rarely employed in making awls, being too fragile to stand hard service. Most awls were probably used in sewing to make the holes in the skin or other material through which the stiff sinew or fiber thread was thrust. Some were doubtless used in basket making, for sewing sheets of bark together to make trays and buckets, and some perhaps as forks for lifting hot meat from the pot.

Next to the bone awls in point of number were the conical arrow points made from the tips of deer antlers cut off, sharpened, and drilled at the base for the reception of the shaft (Fig. 23a). Sometimes a little projection was left at one side of the hole to serve as a barb (Fig. 23b). That arrow points were also occasionally made of bone is shown by the finding of various fragments, one of which, with a restoration based on the style used by neighboring tribes, may be seen in Fig. 29.

A number of fragmentary bone needles also appeared here (Fig. 23e), made, as in the example illustrated, of bird bone; or more often of a

slightly curved strip from a deer's rib; thin and flat, with the eye near the middle, and entirely too broad to use in ordinary sewing. Almost identical needles are still employed among the Central Algonkin tribes, however, for stringing rushes together to make the large mats with which they cover their dome-shaped winter wigwams, so it seems probable that our Shinnecock needles found some similar use. We have historical evidence, to be recounted later, that they used rush mats.

Among the rarer objects were cylinders of antler (Fig. 23c) whose battered ends suggest their use as flint-flaking implements in the manner previously described, a broken harpoon point of deer antler with a perforation and one lateral barb, and a slender barb of bone (Fig. 18c) which may have formed part of a fish spear or may perhaps have been lashed to a wooden shank to form a primitive fishhook, such as is still used among the Montagnais and other tribes. The harpoon cannot be illustrated here, because an important part of it has been lost since finding, but we can state that it had one large lateral barb and was perforated. The use of bowls made of the carapace of the land tortoise, of which numerous fragments (Fig. 10) were found, has been mentioned. That beaver teeth were used for some purpose is assumed from the finding of worked fragments (Fig. 29a). It is known that some tribes had wood-carving tools made of beaver teeth, so perhaps the Shinnecock used them in this way.

The bone implements, complete, broken, and unfinished were studied with some care, and after several attempts had been made to reproduce them in fresh bone with primitive tools, we finally succeeded, and were able to analyze the processes employed. These were sawing, grooving, scraping, grinding, drilling, and polishing. Sawing was accomplished with the edge of a flint knife, a large arrow point, or even with the edge of a large flint flake and was used when it became necessary to cut a piece of bone or antler in two transversely. The edge of the implement was worked to and fro with a saw-like motion against the material until a deep groove was formed. This was continued until it encircled the bone or antler (Fig. 23d) which could then be easily broken in two. Grooving, for the purpose of cutting bone lengthwise, was accomplished with the point of any flint implement or flake. If a strip of bone were needed for the manufacture of an awl, the first step was carefully to mark two parallel longitudinal lines on the surface of the bone selected. These were scratched deeper and deeper with the point of the implement until they became grooves, and finally, until the grooves broke through into the marrow cavity. These slits were connected by a transverse sawing at the ends, whereupon a strip of bone fell out ready for further elabora-



Fig. 27

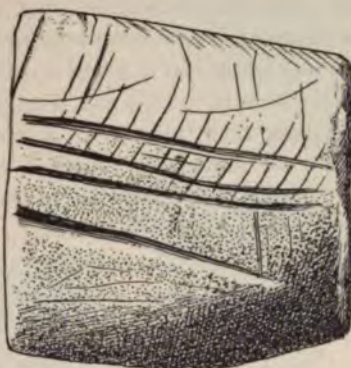


Fig. 28

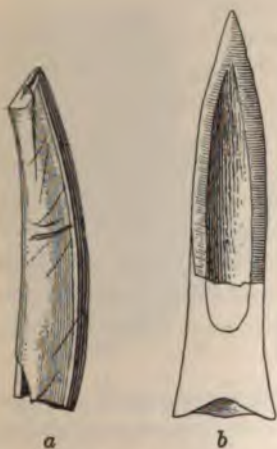


Fig. 29

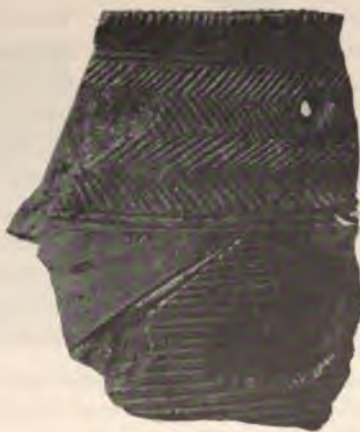


Fig. 30

Fig. 27. Steatite Pipe. Tooker Collection.

Fig. 28 (20-7589). Part of Engraved Stone Pendant.

Fig. 29 *ab* (20-7530, 7553). Worked Beaver Tooth and Restoration of Bone Arrow Point.

Fig. 30 Potsherd, Lenapé Type.

tion. The next step was to scrape off the sharp edges and work out a rough point with a bevelled edge scraper, or even a flint chip, used much as a modern carpenter scrapes wood with a piece of glass; then a gritty stone was employed to grind it into final shape. The marks of this grinding may be seen on the awl (Fig. 24b). The final polish was then put on by rubbing with the smooth surface of a beach pebble. The eyes of the broad bone needles can easily be reproduced with the point of an arrow-head rotated after the manner of a drill, first on one side of the needle until partly bored through, then on the other. Since the cavities in the bases of antler arrow points for the reception of the shaft were deeper they had to be bored with a narrow flint drill which worked best, as experiment shows, attached to a short wooden handle.

*Pottery.* One nearly complete pottery vessel was secured (Fig. 12) and enough parts of another to restore its form, together with many fragments, all of which served to show that the typical ancient Shinnecock pot was somewhat egg-shaped, with pointed base and slightly expanded mouth, of the archaic Algonkin type found all along the Atlantic Coast from Virginia to Maine.<sup>1</sup> This type was, however, modified about the mouth of the Hudson and in New England by Iroquian influence which seems to have first made itself felt shortly before the coming of the whites. In capacity, these vessels seem to have varied from about six quarts to perhaps four or five gallons. That they were used directly on the fire may be seen by the smoked and blackened condition of some of the bottoms. Sometimes, when cracked, they were repaired by boring a series of holes in pairs on opposite sides of the split and then lacing it together, probably with thongs. Such repaired vessels could not very well have been used in cooking, but they must have made good water jars when properly pitched to prevent leakage.

In one pit, we were lucky enough to find the greater part of a potter's outfit, which shed considerable light on the Shinnecock method of making earthenware. The first stage was illustrated by a lump of raw clay and some clay thoroughly mixed with the crushed shells here often used as tempering material; the second, by pieces of clay coils and part of a small unfinished vessel (Fig. 6), all preserved by accidental burning, which showed that the clay had been worked out into long rolls with which the vessel was then built up, coil on coil, the coils being smoothed and blended as the work proceeded. The pit even yielded some tools with which the blending was done, in the shape of two beach pebbles

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<sup>1</sup>Holmes, *op. cit.*, 150-158, 175-179.



Fig. 31 *a-h* (20-7985, 7935, 7810, 7985, 7598, 7985, 7967, 7847). Potsherds showing Decoration.





Fig. 32 *a-e* (20-7920, 7453, 7203, 7451, 7829). Pipe Fragments and Potsherd bearing Sketch of Bird.

showing wear and still daubed with clay (Fig. 4a). In other parts of the site were found clay-covered shells of the "hen clam," the worn edges of which showed long use for such purposes (Fig. 4b).

Some years after these excavations were made, the author had occasion to visit the Indians of South Carolina, where the making of pottery by aboriginal methods was found to be a still living industry. I was interested then to observe that the Catawba used the coil method, blending the coils with smooth pebbles kept constantly wet, and with fresh-water clam shells which showed wear in exactly the same place as the "hen-clam" pottery scrapers we had found on Shinnecock Hills. After completing the vessels the Catawba dried them a few days in the shade and then arranged them around a brisk fire, mouth to the blaze. After a while, they assumed a darker color, and when this had become uniform, a sign the vessels were hot enough, the blazing brands were raked out of the fire, the vessels inverted over the coals and hot ashes which were pushed up around them, and the whole covered thickly with pieces of dry bark pulled from old pine stumps. When the bark had burned away the red-hot vessels were pulled out and allowed to cool around the smouldering embers.<sup>1</sup> Probably the ancient Shinnecock dried and fired their pottery in a somewhat similar manner.

The decoration of Shinnecock ware was effected while the clay was still fairly soft. The crude patterns were produced by several methods, one of them the ordinary one of incising with a sharp point, possibly that of a bone awl (Fig. 31f, Fig. 30). Another method was to wrap a twig in fiber twine and impress this upon the plastic clay (Fig. 31a, d, h), while a third, which seems characteristic of the eastern end of Long Island, was to drag a section of the edge of a scallop shell along in such a manner as to produce from two to six parallel grooves, and sometimes, instead of dragging it, to make successive imprints of the edge of the shell. This method may be seen on the complete vessel (Fig. 12) and on several of the fragments (Fig. 31b, c, e). A punctate form of decoration was also produced by imprinting the round end of a stick (Fig. 31a, g, h). A finish for the body of the vessel was often applied with a paddle wrapped in fiber cord, while the inner surface was sometimes marked by scraping with the edge of a stone serrated by chipping, as was one side of the smoothing stone shown in Fig. 4a.

Quite a number of fragmentary pottery pipes were found, some of them nicely decorated, as may be seen in Fig. 32. These differed from

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<sup>1</sup>Harrington, M. R., "Catawba Potters and their Work" (*American Anthropologist*, N. S., vol. 10, pp. 399-418, 1908).



the stone pipes found in this region by Tooker (Fig. 27) and others in that they were provided with a short stem, sometimes round, sometimes flat in section, made in one piece with the bowl, and did not require a separate wooden stem. How they must have appeared when complete is shown by the perfect specimen (Fig. 34) found at Canoe Place, and now in the Museum of the American Indian, Heye Foundation, as the gift of the Long Island Historical Society.

*Weaving.* That the Shinnecock, in common with most of the Eastern Algonkian tribes made numerous rush mats and wove a variety of sacks and bags, burden straps, and perhaps even garters, belts, and garments out of fiber cannot be doubted; but the only specimens we found to prove it were a few fragments of native cloth preserved by charring (Fig. 3). Noticeable features were the coarseness of the fiber composing the cord of which the fabric was woven, and the fact that the weft threads were run in pairs with a twist together between every strand of the warp, a simple form of the twined weave so characteristic of aboriginal textiles in most parts of North America where any weaving was done at all.

We can prove, as before stated, the use of mats among the Shinnecock and neighboring Indians by several historical references; for instance, in the agreement between Lion Gardiner and the Indians<sup>1</sup> in which he grants them "liberty to cut in the summer time flags, bull-rushes and such things as they make their mats of" on a certain tract "provided they do no hurt to the horses" pastured there.

*Art and Ornament.* The decorative art of the Shinnecock, as shown in wood carving, in the painting of designs on various objects, and in whatever form of embroidery they may have used (probably with dyed deer hair) has been lost beyond recovery. All that remains for us to study are their pottery decorations on vessels and pipes, and a few markings on stone and wood. The story is soon told, for the former are of the simplest. Most abundant are combinations of straight lines forming bands parallel to the rim of the vessel, combined with angles or chevrons which may point horizontally (Fig. 31a, d), or vertically (Fig. 31c). Sometimes lines singly or in parallel groups may run vertically, instead of horizontally, or may be placed diagonally, as may be seen in the whole vessel (Fig. 12), and in the potsherd (Fig. 31e), and cross-hatch patterns sometimes appear (Fig. 31f).

These designs, as before noted, were usually produced by the imprints of cord-wrapped twigs (Fig. 31a, d, h); by groups of parallel

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<sup>1</sup>Southampton Records, *op. cit.*, 170.

lines drawn with pieces of the edges of scallop or mussel shells (Fig. 31c, e, Fig. 12); by imprints of the edges of such shells (Fig. 33b, Fig. 12); and by marks and notches made with the point of a sharp instrument such as a bone awl (Fig. 31f). The lines and angles are often interspersed with circular imprints of the end of some blunt cylindrical instrument (Fig. 31 a, g, h).

The decoration of most of the pottery was exceedingly crude, with no attempt at color work, no curved lines, and with a very few exceptions, no attempt was made at elaborate patterns even in straight lines and angles. There was one exceptional sherd, however, that showed a tasteful, well-executed, and fairly complex pattern (Fig. 30), consisting of a band of closely set chevrons forming a herring-bone design surmounting a band of large triangles filled with parallel horizontal lines and pointing



Fig. 33 ab (20-8036, 7779). Black and Red Paint Stones, Graphite and Limonite, respectively.

upward, the spaces between them being left plain. This, however, is so divergent from Long Island pottery in general, and resembles so closely the Lenapé ware found near Trenton, New Jersey,<sup>1</sup> that the chances are that it was obtained in trade from that region and was not of Shinnecock manufacture at all. The sherd shown in Fig. 31f may also belong in the same category.

The designs just described are all of a purely geometric character; we did find, however, a few attempts at realistic ornament. One of these is the crude drawing of a bird scratched on a stray potsherd (Fig. 32e), an hourglass-shaped figure whose head is represented by a slight projection and the wings by drooping lines. It is particularly interesting on account of its practical identity with drawings still made by the Central Algonkin tribes and their neighbors to represent a Thunderbird, a race of

<sup>1</sup>Volk, Ernest, "The Archaeology of the Delaware Valley" (*Papers, Peabody Museum of American Archaeology and Ethnology*, vol. 5, 1911), pls. CXII, CXIII, CXIV.

mythic beings who were thought to be the patrons of warriors, the bringers of rain for the crops, and the guardians of mankind against water monsters.

Perhaps also connected with tribal tradition are the rough sketch of the head of some animal, possibly a lynx, engraved on one side of a pebble (Fig. 7); while a slight stretch of the imagination might interpret the markings on one side of the circular gorget seen in Fig. 8a as the profile of a turkey, while those on the reverse side may represent a human eye (Fig. 8b).

We found little to indicate personal decoration, except the circular gorgets or pendants (Fig. 22g, Fig. 8), a coarse shell bead, since lost, and the copper bead (Fig. 11) which may be made of native metal. The



Fig. 34. Earthen Pipe, Canoe Place. Courtesy of the Museum of the American Indian, Heye Foundation.

paint, red and black, ground from deeply scored bits of limonite (Fig. 33b) and graphite (Fig. 33a) was probably, for the most part, applied to the faces of the Shinnecock.

*Trade.* As previously noted, the presence of implements made of purple argillite in the refuse deposits indicates trade with the tribes of New Jersey, as does the appearance of a few sherds of typical Trenton Lenapé pottery; fragments of steatite cooking vessels and pipes show commerce with Connecticut tribes (the nearest quarries were there), while a number of objects, all found in the upper layers of the deposits, bear witness to the latter day trade with the whites. Examples of these are shown in Fig. 15 and consist of a gun flint (*a*), the handle of a brass kettle (*b*), and part of a trade pipe of clay (*c*).

If the copper bead, which, as may be seen from the drawing (Fig. 11) has been made by rolling a flat bit of the metal into cylindrical form, should prove on analysis to have been made from a native nugget, inter-tribal trade from so distant a region as Lake Superior would be estab-





Fig. 35. Portrait of Wickam Cuffee.



Fig. 36, Portrait of Charles S. Bunn.



Fig. 37. Portrait of Mrs. A. E. Waters

lished. If not, we have merely another specimen showing trade with Europeans.

*Fate of the Shinnecock.* The Shinnecock truly sold "their birthright for a mess of pottage" in 1640 when they placed their marks as signatures on the first deed to the English settlers. From that time onward, the town records of Southampton<sup>1</sup> are our best source for learning what befell them. We find many early town ordinances that must have proved irritating in the extreme, for example, the one before quoted, forbidding the Indians to dig for ground nuts. We observe also that they were at first not permitted in the town at all, that no one was allowed to sell them food; and perhaps most onerous of all, that they were ordered to kill their dogs. No wonder they were sometimes rebellious, and once attacked Southampton and burned several houses, for which damage they were later compelled to pay.

On the other hand, we find that it was lawful to sell food to the sachem for his own use, but to no one else, and in another place it was made lawful to sell an Indian flour, provided it was of the coarsest quality. In 1649 it was permitted to the Indian women to come to town on shopping tours, and then the same privilege was extended to the "ancient men" to do the same, but these must first obtain "tickets." Still more considerate was an ordinance forbidding the whites to turn out their "Hoggs or piggs" on the Indians' land, that their corn be not damaged, and another in 1653 providing that "if the Indians will suitably fence one half between them and us that then ye towne will fence the other half." By 1675 the relations of the two races had so improved that many Indians were employed by the whites to go to sea for them in pursuit of whales.

Of the Shinnecock's relations with other Indians we learn of their distress on account of a threatened attack by "Naragansets" in 1653, and of their submission to Wyandance of Montauk, whom they acknowledged as "Sachem of Pawmanack or Long Island." He however was brother of their own chief, Nowedonah.

Little record was made of the Shinnecock after they ceased to be, from the settler's point of view, a menace to the colony, and took their place in its whaling and other industries. We learn from other sources<sup>2</sup> that many of them went to Brotherton, in Oneida County, New York, about 1789, where they joined the remnants of various New England tribes, and in 1833 moved with them to Wisconsin, where their mixed descendants may still be found.

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<sup>1</sup>Southampton Records, *op. cit.*

<sup>2</sup>"Handbook of American Indians" (*Bulletin 30, Bureau of American Ethnology, Washington, 1907, 1910*), part 1, 166; part 2, 550.



Fig. 38.



Fig. 39.

Fig. 38. Portrait of John H. Thompson.  
Fig. 39. Portrait of Mary Ann Cuffee.

Some of those left behind intermarried with negroes, a phenomenon seen among several remnants of Atlantic Coast tribes and among some Muskogean peoples, but exceedingly rare elsewhere, fortunately for the future of the Indian race. Certain it is that the African mixture has lost for the Long Island survivors the respect and support of the Iroquois tribes who now will not recognize them in any way, and will not even admit that there is any Indian blood left on Long Island.

There has been a heavy infusion of white blood too, but affairs had progressed so far that when I paid my first visit to the Shinnecock "Reservation," in 1902, the place appeared to be a negro, or rather, mulatto settlement, pure and simple. But more careful search revealed a number of individuals showing Indian characteristics. To quote my notes, written at the time:—

Some are black and woolly headed, having at the same time facial characteristics distinctly Indian. Others have the straight hair and light color of the Indian, but the flat nose, large dull eyes, and thick lips of the negro. A few of the men are typically Indian. Of these, Wickam Cuffee (Fig. 35) is the best example. He is Indian in color and feature, and claims to be full blooded, but the slight curl in his hair seems to point to some admixture. He speaks with a Yankee accent, and gladly tells all he knows of the old times. Andrew Cuffee, the blind ex-whaler, also presents many Indian characteristics, while Charles Bunn, Fig. 36, (with a slight tinge of negro) and John Thompson (Fig. 38) (part white) are good types. Very few of the young men on the reserve show Indian characteristics. A number of the women are pure or nearly pure-blooded Indian. Among them are Mary Brewer, Mary Ann Cuffee (Fig. 39) and Mrs. Waters (Fig. 37). The preponderance of women over men is accounted for by the drowning of most of the Indian men when the ship *Circassian*, stranded off Easthampton, was destroyed, on December 31, 1876, by a sudden storm. Then it was that the corpses of the Shinnecock salvors, each incased in a mass of frozen sand, were found scattered along the bleak ocean beach from Amagansett to Montauk. Thus perished the flower of the tribe—the expert whalers who had sailed on many successful voyages out of Sag Harbor or New Bedford—the men whom their white neighbors still speak of as being "noble-looking, strong, and tall."

Many of the survivors, especially the younger ones, have left the reservation, and are now scattered abroad. The only Indian children seen during my entire stay were visitors from Shinnecock families settled elsewhere.<sup>1</sup>

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<sup>1</sup>Harrington, M. R., "Shinnecock Notes" (*Journal of American Folk-Lore*, vol. 16, 1903), 37-39.



That such survivors still exist and still show strong Indian characteristics without visible African admixture is proved by a photograph recently taken at Easthampton which was published in the *New York Evening Post*, March 18, 1922. Very likely the destruction of the "flower of the tribe" in 1876 left the negroid mixed-bloods in the majority in the settlement, which was so distasteful to the remaining Indian families that all who were financially able moved away.

### CULTURAL AND LINGUISTIC POSITION

Our investigations, so far as they went, show that the Shinnecock were, in a general way, similar in material culture to the other tribes of Long Island and the coast of the adjoining mainland. However, they differed in some particulars from the tribes at the western tip of Long Island and elsewhere in the immediate vicinity of New York City, for which region we possess considerable data.

For instance, the Shinnecock seem to have used the dome-shaped, thatched wigwam in preference to all other types, a variety not mentioned by early travelers about New Amsterdam; also, their pottery, although similar in form to the archaic ware of western Long Island, differs from it in the more abundant use of pounded shells for tempering the clay, and in certain decorations. Moreover, the Shinnecock made little use of the grooved ax, so popular among the Rockaway and Canarsie, and used many more crude, broad, triangular, stemless, white quartz arrow points than points of other shapes and materials; while in western Long Island the triangular form is in the minority. A similar state of affairs, exists in the shell-heaps of eastern Connecticut<sup>1</sup> the significance of which will be seen later. Another feature in which the Shinnecock differed from the tribes about New York City was in the use of the circular stone pendant, seldom seen in the latter district.

When the writer visited Shinnecock in 1902 he found the language dead, and was able to collect only the few words given below, although it was afterward learned that there were persons, living away from the settlement, who might have furnished at least a much larger vocabulary. The list is given for what it is worth, with a few suggestive comparisons, merely with the comment that the first two words were found also among the Poosepatuck mixed-bloods on Long Island.<sup>2</sup>

It will be noticed that there are many more correspondences between Shinnecock and Natick and Narragansett than between Shinnecock and Delaware, Abnaki or Sauk, and that Narragansett seems nearest of all on account of the remarkably close resemblance of some of the rarer words. It is also interesting to note that good cognates in Algonkian

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<sup>1</sup>In the collection of Mr. Norris L. Bull of Hartford, Connecticut, may be seen rude triangular quartz arrow points, antler fish hooks, forms and decorations of pottery, and decorations on earthen pipes, practically identical in detail with those found at Shinnecock Hills. These were discovered in a shell-heap near the mouth of the Niantic River. Specimens from shell-heaps further west, near Milford, for example, do not show this close resemblance.

<sup>2</sup>The Natick and Narragansett words are from Trumbull, James Hammond, "Natick Dictionary" (*Bulletin 85, Bureau of American Ethnology*, Washington, 1903); the Delaware from Brinton, Daniel G. and Anthony, Albert S., "A Lenapé-English Dictionary" (*Pennsylvania Students Series*, vol. 1, Historical Society of Pennsylvania, Philadelphia, 1888), plus one word, *sápan*, collected by myself; the Abnaki is from Elijah Tahomont, an Abnaki of St. Francis, Quebec; the Malecite is from Dr. Frank G. Speck; while the Sauk is from the late Dr. William Jones.

English	Shinnecock	Natick	Narragansett	Abnaki (St. Francis)	Malecite	Delaware	Sauk
turtle	matci'k				miktciik = tortoise		meci'káha
snake	skuk	askook	ask'ús	skuks		achgook	
man	tcais'	kehchis = old man	chise = old man				
woman	wí'nai'		wenýgh				
woman	skwa	squaas	squáws	skwa		ochqueu	i'kwáwa
child	papús	papeissesu = little one	papooos				
sea-beach	siwáa	sée = sour		siwán = salt		schewewah = salt	
rain	ké'mlo						kémiyawí
house	wí'kam	weck = his house		wí'kóm	kemi'wan		wíkiyapi
corn mush	suppá'n	saupáun = softened				{ sachspan = soup sá'pan = mush	
shellfish	sé'tcawa		sucksawaug = clams (Pequot)				
thanks!	tabttni'	tabuttantam— he is thankful	taubut neansawáyeau = I thank you				
greeting!	hah'cami						haul
come							
quick!	mélwi'		muckquetu— he is swift				

<sup>17</sup>The words *kécin*, husband, old man, and *wí'nai'*, wife, old woman, occur in the Mohogan dialect spoken until recently in Connecticut; Speck, Frank G., "Notes on the Mohogan and Natick Indians" (This series, vol. 3, 1909), 194.

<sup>18</sup>"Chise" appears in the Southampton records as the name of a Shinnecock sachem.

dialects were easily found for all the Shinnecock words collected except the greeting "hah'cami."

The writer makes no claim to a knowledge of Algonkian languages and has probably overlooked important evidence, but it seems safe to state, on the basis of this brief vocabulary alone, that the Shinnecock language was more nearly related to the Southern New England group of Algonkian dialects than it was to the Lenapé (Delaware) group or to the Abnaki group, and this same conclusion has been reached independently by Speck<sup>1</sup> and by Tooker.<sup>2</sup>

Archæologically, we have the evidence of the wide triangular white quartz arrow points, before mentioned, as a favorite form, the pottery, the decoration on the earthen pipes, and the antler fish hooks, connecting the Shinnecock material culture with that of southern New England, particularly eastern Connecticut, but further investigation is needed in both regions before we can make full comparisons and be certain of Shinnecock relationship in this respect. Such comparisons would be particularly interesting in view of the fact that the Shinnecock kept their ancient culture, if not their blood, pure to the last, unmodified by the Iroquois influence that had made itself so strongly felt about the mouth of the Hudson and even in many parts of New England shortly before the arrival of the whites.

Judging from the conditions noted at Sebonac, we might conclude that wherever the Shinnecock came from, they had not been located in eastern Long Island more than a few hundred years before the coming of the whites; but we cannot state this as a fact, for other sites may be found showing longer occupation. This is another question to be settled by further explorations, which might also reveal the identity of their predecessors, whose existence was suggested by the finding of a few archaic, apparently non-Shinnecock specimens below our village layer.

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<sup>1</sup>Dr. Frank G. Speck wrote me in a personal letter that he believes that the Shinnecock belong linguistically to the Southern New England group, and expresses the same idea in a manuscript, *Native Tribes and Dialects of Connecticut* to be published by the Bureau of American Ethnology.

<sup>2</sup>The similarity of the eastern Long Island and southern New England dialects is brought out in Tooker, William Wallace, *John Eliot's First Indian Teacher and Interpreter, Cockenoe-de-Long Island*, New York, 1896).



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**ARCHÆOLOGY OF THE MISSOURI VALLEY,**

**BY**

**GEORGE F. WILL.**



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BY GEORGE F. WILL.





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## INTRODUCTION.

The purpose of this paper is to give a general view of the archæology of the Missouri Valley in northern South Dakota and in North Dakota and of the drainage on either side of the valley which is locally known as the 'Missouri slope'. Within this area a field is presented for a large amount of valuable archæological work that should be accomplished in the near future.

Up to the present the undertakings in this field have been very few. Most of them were in the nature of preliminary surveys and there has been no attempt at systematization. One of the first of these undertakings was begun about 1900 by Mr. J. V. Brower of the Minnesota Historical Society, assisted by Mr. E. R. Steinbrueck of Mandan, North Dakota. Some of the sites within the area were explored, but the work was principally confined to the collection of artifacts.

Soon after this time, the North Dakota Historical Society was organized, and Mr. Steinbrueck was engaged in archæological field-work in behalf of that body for several years. In the course of these years, many valuable specimens were collected, some maps were made, a large number of sites were located, and a considerable mass of notes taken. No detailed exploration of any single site was made, however, and none of the notes taken have been published.

For several years after Mr. Steinbrueck severed his connection with the North Dakota Historical Society, that organization carried on some further work. These undertakings included the mapping of some five of the old village sites, the maps being published in the society's reports; and in conducting a party of the older Indians along the river, to learn what they could tell of the old villages. No report on this last work has been printed. In recent years, the State society has become the owner of several of the more notable village sites, but up to the present no systematic excavation and study has been done.

In the summer of 1905 the Peabody Museum of Harvard University sent out an expedition which did a considerable amount of connected work upon one of the old Mandan village sites, the Burgois or Double Ditch site. The results of this work were printed.<sup>1</sup>

In 1911, in company with Dr. H. J. Spinden, then of the American Museum of Natural History, the writer spent a month along the Missouri, locating village sites and other points of archæological interest. The information obtained on that occasion will be embodied in the present paper, together with such observations as have been made during

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<sup>1</sup>Will, George F. and Spinden, Herbert J., "The Mandans: A Study of Their Culture, Archaeology, and Language" (*Papers, Peabody Museum of American Archaeology and Ethnology*, vol. 3, no. 4, Cambridge, 1906).

various trips along the Missouri and through the country back from the river, on several visits to the Fort Berthold Reservation, and such facts as have been elicited in conversations on the subject with a number of individuals.

In the fall of 1919, with Dr. Spinden, some ten days were spent in a rather careful survey of the sites below Heart River. Several maps were made and small collections of pottery and other artifacts were taken from the various sites. New material obtained at this time is included in or appended to this paper.

The drawings are all the work of Dr. H. J. Spinden, who also assisted in much of the work involved in the preparation of this paper.

Dr. Melvin R. Gilmore of the North Dakota Historical Society and Mr. George E. Hyde of Omaha, Nebraska, have read the manuscript and assisted with advice and comment. Notes, embodying the comments of both of these men, will be found appended on many of the pages.

### ARCHÆOLOGICAL FEATURES.

The objects and sites of archæological interest occurring in the upper Missouri area may be roughly divided into five classes:—

1. Boulder effigies.
2. Tipi rings.
3. Mounds, distinct from those of the village sites.
4. Miscellaneous: cairns of various sorts; commemorative marks; eagle-pits; sacred and traditional sites; various sacred natural objects; and burial sites.
5. Old village sites.

Some of these classes are but poorly represented in this region, the village sites, in point of numbers, of relative importance and interest, standing far above any of the others.

*Boulder Effigies.* Boulder effigies have been generally described by Thomas, who gives a number of instances of their occurrence further south. They are attributed to the Dakota, or Sioux, and one would naturally expect to find them of frequent occurrence in the trans-Missouri country, the home of this people during the last century and a half. Up to the present, however, only two boulder effigies have been noted in this region, west of the Missouri, both apparently depicting turtles.<sup>1</sup>

One of these was found on a low hill on the south side of the Cave Hills, in South Dakota, just south of the state line.<sup>2</sup>

The other effigy was found in Oliver County, North Dakota, by a party sent out by the State Historical Society. This effigy was carefully taken up and placed in the State Capitol grounds, at Bismarck, where it may now be seen. It is described in the society's reports.<sup>3</sup>

*Tipi Rings.* Tipi rings occur with considerable frequency over all of this area, sometimes large numbers together, but often only one or two in a place. There are two forms of the tipi ring— that marked by a circular depression in the sod, and the other form made up of a circle of small boulders, which are supposed to have been used for holding down the edges of the tipi. The latter is the most common, as the rings formed

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<sup>1</sup>Since the effigies in Wisconsin and eastern Iowa are generally attributed to the peoples of the Winnebago group, in which were included the Oto, Iowa, and, by some, the Mandan, all of which tribes are supposed to have migrated westward through the region in which most of the boulder effigies occur, there would seem to be less reason for supposing that these effigies were the works of the Dakota, who do not appear to have been effigy-builders in their old home on the upper Mississippi, than for assuming these works to be the outcome of an attempt on the part of the peoples of the old Winnebago group to continue during their westward migration their old custom of effigy-building, the use of boulders instead of earth in this work being the result of the less settled life they led after they began their movement toward the Missouri.—George E. Hyde.

<sup>2</sup>Will, George F., "Some Observations made in Northwestern South Dakota" (*American Anthropologist*, N. S., vol. 11, pp. 257-265, 1909), 262-263.

<sup>3</sup>See *Reports of the North Dakota Historical Society*, vol. II, 685.



by cutting out the sod and banking it up against the sides of the tent are much sooner effaced.

It is possible that a curious group of depressions, described in a previous paper,<sup>1</sup> belongs to the tipi ring group. This site consists of some thirty or forty rings on a hill, the rings being from six to ten feet in diameter—rather small for tipi rings, but possibly representing an excavation for some purpose within the tipi.<sup>2</sup>

*Mounds.* The Upper Missouri valley is not rich in mounds aside from those which occur in connection with the village sites. Further to the north and east, the mounds are of more frequent occurrence. A number of mounds resembling very closely those across the border in Manitoba (attributed to the Assiniboin), occur along the Mouse River, in North Dakota.<sup>3</sup> Further south, the North Dakota Historical Society has located a number of similar mounds on the upper waters of James River, and mounds of a similar character have been reported on the Cheyenne River, near Valley City, North Dakota, and in the Coteau du Missouri near Streeter, North Dakota.<sup>4</sup>

Along the Missouri, however, the only mounds of this nature so far reported are on the banks of Apple Creek, near Bismarck, North Dakota. These have been described in a previous paper.<sup>5</sup> Some of these mounds recall certain of the Wisconsin mounds in size and shape.

One other mound form might be mentioned here, for, although it occurs, so far as known, only in connection with a village site, it appears to be independent of the actual village remains. The only example of this type so far investigated occurs in conjunction with an old village, considered as Mandan by the Dakota, located on the south bank of Cannonball River and not far from its mouth. This mound, designated

<sup>1</sup>Will, G. F., "Some New Missouri River Valley Sites in North Dakota," (*American Anthropologist*, N. S., vol. 12, 58-60, 1910), 60.

<sup>2</sup>The Cheyenne traditions state that the lodges their people made when they lived east of the Missouri were very small. They describe several types of lodges used at different periods, most of which appear to be merely variants of a common form. In the earlier period, they lived near a lake in a tall-grass country and made small lodges of poles covered with mats; in winter, they made large bundles of long grass and piled them up around the edge of the lodge for warmth. Later, when we may assume, they moved into the short-grass plains of eastern North Dakota, they speak of making similar small lodges, covered with skins, and as they had no tall-grass to make into bundles and pile up around the walls of the lodge in winter, the natural thing for them to have done would have been to excavate and pile up the sod around the lodge. They speak of living in 'dug-outs,' which they do not describe in detail, but the term would fit well a small lodge with the floor excavated and the sod piled up against the wall outside to give warmth. These lodges were all very small, such as could be transported by dogs.—George E. Hyde.

<sup>3</sup>Thomas mentions similar mounds on Red River, from Grand Forks northward, and Professor Montgomery informed him that the same type of mound is found in Benson, Ramsey, and Walsh counties, North Dakota, which would seem to form a more or less defined line of these mounds from Grand Forks to the Mouse River. See Thomas, Cyrus, "Report on the Mound Explorations of the Bureau of Ethnology" (*Twelfth Annual Report, Bureau of American Ethnology*, Washington, 1894).

<sup>4</sup>Will, George F., "An Unusual Group of Mounds in North Dakota" (*American Anthropologist*, N. S., vol. 23, pp. 175-179, 1921), 175.

<sup>5</sup>"A New Feature in the Archeology of the Missouri Valley" (*American Anthropologist*, N. S., vol. 13, 585-588, 1911).

as a sun mound by the Dakota, was opened and partially excavated by the North Dakota Historical Society in the summer of 1915. No report on the operations has been printed, but it is known that several interesting finds were made. So far as can be gathered from the rather hazy answers to questions asked of several Mandan, such mounds were frequently built near Mandan villages and had some deep religious significance not yet definitely revealed. A similar low mound was pointed out near the old Fort Berthold village site.<sup>1</sup>

*Miscellaneous Features.* Of the miscellaneous features of archaeological interest there are many within this area. Cairns of rock occur frequently and are apparently of several classes. In the region west of the Missouri and extending to the Bad Lands, large rock cairns are frequently noticed on the tops of many of the highest hills or buttes. Several of these have been described in a previous paper.<sup>2</sup> They were probably built by the Dakota, some of whom say that they mark points whence good water can be seen.

Another type of cairn, not so frequently seen, appears to be commemorative in its nature. The only one of these definitely described occurs on the edge of the lower village site near Sanger, North Dakota. Mr. Sanger, the first settler in the vicinity, tells of visiting the village site in company with several Indians of the Fort Berthold Reservation. As they went along, each Indian picked up a small stone and when the party reached the cairn each individual carefully placed his stone on the pile. The Indians told Mr. Sanger that they did this in memory of their ancestors who formerly lived there.

Still another type of cairn occurs occasionally on the hills in the neighborhood of the old village sites. These are smaller and less conspicuous and are unquestionably the 'minaki' or individual piles of stones so frequently mentioned by the Mandan as being erected by young men at their places of vigil.<sup>3</sup>

Although not exactly a cairn, we will here include a most unusual object which occurs on the top and about at the center of a medium high hill of some length, about four or five miles west of the Missouri and west of the Square Buttes, in Oliver County, North Dakota. This is known locally as Ring Hill. It consists of a circular wall of stones, some 15 to

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<sup>1</sup>I have had some suggestions from Indian sources which seem to hint that this mound at Cannonball may have been an "astronomical observatory" by which the times of equinox and solstice were determined.—M. R. Gilmore.

<sup>2</sup>"Some Observations made in Northwestern South Dakota" (*American Anthropologist*, N. S., vol. 11, 257-265, 1909).

<sup>3</sup>The Omaha made commemorative marks at their places of vigil by denuding a circular spot of turf, which clearing they re-visited and re-cleared every year. I have seen such circular cleared marks of individuals of the Omaha kept as late as 1906.—M. R. Gilmore.

20 feet in diameter, and of a present height of about 3 to 4 feet. The interior is roughly paved with boulders. There is a similarly paved walk or approach, from the south, some 30 to 40 feet long and 3 or 4 feet wide, widening toward the ring and terminating against the wall in what may have been a rough step. There appear to be several figures traced out in boulders and leading out from the circular wall, but this point could not be definitely determined, as the top of the hill is so thickly strewn with small natural boulders. It is certainly a very unusual work, and, so far as can be determined, there is but one explanation of its purpose. This occurs in the account Alexander Henry has left us of his journey to the Cheyenne village with the Gros Ventre and Mandan. He states that a certain hill, some distance south of Fort Clark, and apparently in the same vicinity as Ring Hill, was considered very sacred by the Indians. Here the expedition halted for some hours, while all the people sang and prayed and the medicinemen went through certain ceremonies. He makes no mention of any structure on the hill. If his account is not a reference to the Ring Hill site, all that may be stated is that, so far, no information at all concerning this site has been collected.<sup>1</sup>

An interesting commemorative feature has come to light recently. On the level plain to the northeast of the old Fort Berthold village, and very close to it, may be seen a number of huge hoof marks, each two feet across and formed by the complete excavation of the sod in the figure of a horse's hoof. These hoof marks form a regular trail which starts near the village and proceeds about 150 yards to a point marked by a larger excavation, then returns, on a more southerly line, for about the same distance toward the village. Inquiry among the Indians elicited the story of these curious marks.

We quote here Dr. Gilmore's account:—

There exists a monument to the memory of a Mandan hero which has never before been described and published. The following account is from information given by several persons of the Mandan, Hidatsa and Arikara tribes. The location of the monument is near the site of "Fish-hook Village" on the north side of the Missouri River some twelve or fifteen miles east of Elbowoods.

During the middle part of the 19th century the three tribes, Arikara, Hidatsa and Mandan, lived together in alliance against their common enemies. Their

<sup>1</sup>Possibly a ceremonial pound for calling the buffalo. George Bent told me that when the Cheyenne were all on foot in early times they often had difficulty in getting near the buffalo, and there were medicinemen whose special duty it was to call the buffalo near the camp by means of ceremonies. He believed they built a ceremonial buffalo pound, with wings or walks extending out from the enclosure. These pounds were not for actual use, but for ceremonial purposes only.

Dr. A. J. Comfort describes a hill on the road between Fort Wadsworth and Fort Stevenson, with sides paved with buffalo leg bones; from this central paved area walks or paths formed of similar leg bones led out for several hundred feet in different directions. ["Mounds near Fort Wadsworth, Dakota Territory," *Smithsonian Report for 1871*, 389-402, Washington, 1873, 398.] George Bent thought this arrangement of buffalo leg bones might be one of the old ceremonial figures, intended to represent a pound, and used by the medicinemen in attracting the herds.—George E. Hyde.

chief enemies were the Dakota. So these three tribes built their three villages adjoining, making one compound village of three wards. The village lay upon a well-drained terrace of the Missouri River, while their farms were laid out in the fertile alluvial "bottom" along the river both above and below the village. To the north of the village site lies a range of hills.

The enemy many times made raids upon the village. They would approach under cover of the hills to the north and then steal close upon the village through the course of a ravine which skirted the northeast and north sides of the village.

About sixty-six years ago such an attack was made by a war party of Dakota. Of the defenders of the village, two young Mandans, brothers, named Lefthand and Redleaf, had been dismounted and their retreat cut off by the enemy. A brother of these two, Whitecrow by name, saw the danger of Lefthand and Redleaf and rode out to their assistance. Lefthand was killed and Redleaf was defending the body from a Dakota who was trying to take the scalp. Redleaf shot at the Dakota and missed him, the bullet going over the enemy's head and striking into the ground beyond him, the enemy being crouched low at the time of the shot. Whitecrow rode in a circuit beyond these combatants and held off the attacking party of the enemy. He killed the Dakota who was engaged in combat with his brother Redleaf. Then Whitecrow picked up Redleaf upon the horse with himself and carried him safely back to the village.

After the enemy had been driven away the Mandans went out and marked the course in which Whitecrow had ridden to his brother's rescue, the spot where Lefthand had been killed, the spot where Redleaf had made his stand, the spot where the Dakota was killed, and the spot where Redleaf's bullet, fired at the Dakota, had struck into the ground. The method used for marking these places was by removal of the sod, leaving holes in the ground. To mark the course of Whitecrow's horse the sod was removed in horsetrack shaped sections consecutively from the point of advance from the village round the place of combat and returning to the village. The horsetrack marks were made about two feet in diameter. All these marks commemorating the entire action, which took place about the year 1853 are still plainly evident, being renewed whenever they tend to become obliterated by weathering and by advancing vegetation. March 26, 1919.

The making of these commemorative marks in honor of this man had a ridiculous sequel. On a drive with an Indian along the old trail, from the south side of the Missouri near Elbowoods to Hebron, North Dakota, about ten miles south of the river, my attention was directed to a pile of stones on a low knoll, not more than forty yards from the road. On closer examination a line of stones, spaced about three feet apart, was seen, leading up to the heap of stones. This seemed to bear the ear-marks of an interesting archæological find. Then came the story.

It seems that the hero of the episode at the Fort Berthold village had a brother of less renown than himself. Many years ago, as this man was traveling along the trail, he observed an antelope at the point now marked by the pile of stones. The animal was lying down; the range was ridiculously short. The man stopped, seized his gun, and fired; but the

antelope continued to recline calmly on his knoll. Several more shots were fired with the same result; and then, to the Indian's chagrin, the antelope, perhaps finding the vicinity too noisy for a sound nap, arose and walked away. In some way this affair became known, and the young men of the reservation carefully placed the stones where they now are to be seen, as commemorative marks, in imitation of the hoof marks made in honor of the more famous brother. Often did the butt of this bit of Indian humor remove and scatter the stones; but just as often were they carefully replaced by the young men, and now they will probably remain undisturbed for many years.

Widespread throughout the region—along the bluffs of the Missouri and its tributaries, in the Bad Lands and among the scattered hills and buttes—are old eagle pits, wherein the eagle hunters concealed themselves under a covering screen of sticks and sod upon which was laid a bait of meat. Here the hunters seized the eagles by the legs, as they came to feed, and plucked their highly esteemed tail feathers. Usually a litter of small sticks in the bottom of the pit marks the remains of the covering screen.

For the reason that all of the Siouan tribes of this region used the tree or scaffold method of burial, there are few graves to be found, except in the immediate vicinity of old Arikara village sites. This people always buried their dead in the ground.

One unusual burial has, however, been observed. This has been described in a previous paper,<sup>1</sup> and occurs near the unusual mounds above mentioned, on a point of a high bluff overlooking Apple Creek from the south. Apparently a number of individuals were here buried in a very small area.

Another unusual feature in the region are the carvings on the walls of the entrance chamber to the large cave in Cave Hills, South Dakota. These carvings are very numerous and rather elaborate; but as they are done in very soft sandstone many of them have disappeared. They are described with illustrations in a previous paper.<sup>2</sup> As the Cave Hills country was frequented as a hunting ground by both the Village Indians and the Dakota, it is difficult to say whether these petroglyphs should be ascribed to one or the other peoples, or to some earlier dwellers in this region.

Some six miles south of Elbowoods on the Fort Berthold Reservation, and on the south side of the Missouri, is a fertile bottom overlooked

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<sup>1</sup>"A New Feature in the Archeology of the Missouri Valley," (*American Anthropologist*, N. S., vol. 13, 585-588, 1911), 587.

<sup>2</sup>"Some Observations made in Northwestern South Dakota," (*American Anthropologist*, N. S., vol. 2, 257-265, 1909).

by a narrow bench, which holds an important place in Mandan and Hidatsa tradition. This place is the original seat of the Grandmother or Old Woman Who Never Dies. Along the edge of the bench is a narrow slough, running into the Missouri, which is rendered into English in the old stories as the "Short Missouri." On the low bottomland the Grandmother is said to have had her vast cornfield in which her laborers, the deer and blackbirds, carried on the work. On the edge of the bench, and at present in the dooryard of James Holding-eagle, is a perfect earth-lodge circle some sixty feet in diameter. There are no other lodge rings anywhere in the vicinity, and this one is believed by all the older people to be the remains of the Grandmother's solitary abode.

*Natural Objects of Veneration.* This completes the list of archaeological miscellanies in the region, so far as they have been observed. There is a large class, not exactly archaeological, but bearing some relation to archæology, of various natural objects which are much venerated and which play an important part in the traditions of the region. First in this class come several sacred stones or rocks.

Best known of these, perhaps, is the Standing Rock, for which Standing Rock Reservation is named. This appears to have been an Arikara 'medicine' long before the Dakota came to the Missouri. In 1804 it was located on the east side of the river, on the upper course of Spring Creek. This rock has been mounted on a permanent base and now stands on a hill near Fort Yates, North Dakota.

On the Fort Berthold Reservation there are at present three sacred rocks which have come under observation. One of these stands near the door of the Arikara earthlodge dance house on Beaver Creek. It is kept wrapped in cloth with only a small portion exposed to the view. This rock has the appearance of an ordinary granite boulder. Arikara tradition says that it represents the Standing Rock stone. A second and very similar stone lies in the dooryard of James Holding-eagle, near the Grandmother's lodge. It was, however, only recently moved there from a point not very far away. This stone, while possessing some interest to the local tribes, is said to be especially esteemed by the Crow. Whenever they visit the Reservation they take occasion to see the stone, usually leaving with it a present of cloth, which they wrap around it, or of coin, which they place under it. This stone is also said to have fallen from the skies although it, too, appears to be an ordinary granite boulder.

Recent inquiries have elicited the information that this stone is connected with the well-known story of the girl who married the man from

the sky where she went to live with him. She later attempted to return to the earth, and her husband, discovering her hanging from the cord of buffalo hide, cast down a stone which crushed her to earth. The stone we are describing is declared to be the one which killed the woman.

The third rock on this Reservation is rather different in its nature. It was not visited, but its location was given as about seven miles northwest of the Grandmother's lodge circle. It is on a high ridge and is described as a large rock embedded in the side of the hill, with a large flat surface exposed. According to the story, the Grandmother frequently sent visiting Hidatsa to this stone, on which occasions there were always prophetic pictures visible upon it. There are a number of tales detailing various prophecies made by this rock, and it is believed that pictures may even yet be seen on its surface at times.

Of other named and esteemed natural objects in the region there are, of course, many, each having its own story. Only a few of these have as yet been investigated, however. In the vicinity of the Grandmother's lodge, so full of objects important in tradition, is also Red Butte. This is within a half mile of the lodge ring, toward the south, and is known as the Snakes' House. Several stories are told of the visits of the culture-heroes to the interior of the Snakes' House and of their struggles with the dwellers therein. It is an interesting fact that this butte really is a den of rattlesnakes, two white men having killed well over one hundred snakes there in one afternoon in 1914.

The big cave in Cave Hills is, of course, held in much veneration, as the elaborate carvings about its entrance show. Still another traditionally important orifice is the hole located in the top of Kill Deer Mountain. This is a round opening in the cap rock, some three or four feet across, leading down into a fissure of unknown depth. According to the Fort Berthold Indians this is the opening from which the first buffalo originally emerged upon the surface of the earth.

East of the Missouri, some thirty or forty miles distant from it stands Dog Den Butte, one of the most noticeable and prominent elevations of the Coteau du Missouri in North Dakota. This butte plays an important part in many stories, and is prominent in one of the oldest of the Mandan-Hidatsa traditions as the place in which Coyote Chief shut up all of the game animals of the world, in an attempt to starve the people.

Besides these natural objects and embellished natural objects noted above, there are many other similar things scattered over the state of North Dakota which have never been noted or described. There are stories of several carved boulders in different parts of the state. There

are hills and lakes with interesting traditions attached to them, some of which go by names which can be traced back to these old stories of which the present generation knows nothing. A striking case of the corruption and final loss of old names occurs in connection with a creek on the Fort Berthold Reservation. This creek now has two names—Rising Water, and, more commonly, Lucky Mound or Lucky Mountain Creek. Examination of the old accounts and old maps shows the name, L'eau qui Monte, as being the original translation by the French of the Indian name, hence Lucky Mound, of which no one in the locality can at present offer any explanation.

There are traditions connected with many other natural features, from Elbowoods down to Grand River, and there are specially named natural objects, such as the butte, into which Black-tail Deer, in one of the tales, disappeared. The butte is just south of Little Heart Creek. There is also the Holy Hill of the Mandan, near Cannonball, the hill on Knife River, where the little people live, and many others of which we have not even heard.

Enough has been presented in the preceding pages to show that a large amount of material lies in this region for further investigation and study. It is to be hoped that this work will soon be taken up.

*Village Sites.* Let us turn now to the largest and perhaps most interesting class of archaeological material of the region—the old earth-lodge village sites, a field, which if properly and systematically worked would yield us almost complete data on the early culture and history of some six or seven tribes of the upper Missouri Valley.

Village sites are, of course, scattered along the Missouri from the mouth up, and they extend along its course to the mouth of the Yellowstone, frequently the territory of one tribe overlapping that of another. The section, however, which it is proposed to discuss here, is practically bounded on the south by Grand River, in South Dakota, although some mention may be made of sites farther down.

The tribes which have been directly concerned with the building of earthlodge villages, within the bounds above mentioned are: the Arikara, the Cheyenne, the Mandan, the Hidatsa, and the Amahami.

The Arikara, of the Caddoan stock, and at one time a part of the Skidi Pawnee, quarreled with that people and separated from them very



early in the eighteenth century.<sup>1</sup> According to their traditions they were at that time a very powerful tribe. After leaving the Skidi they established themselves on the Missouri and gradually moved northward along that stream. Old Arikara sites are located near the mouth of Bad River, where they were visited by the younger Vérendrye in 1743<sup>2</sup>, near the mouth of Cheyenne River, where Trudeau<sup>3</sup> found them in 1795, about the mouth of Moreau River, and above the mouth of Grand River, where they were visited by Lewis and Clark in 1804.

The Arikara villages near Bad River appear to have been abandoned about 1770 because of the hostility of the Dakota, who at that period began to press to the Missouri from the head of the Minnesota River. Personally, I believe this Teton movement to the Missouri was the direct outcome of the procuring of arms and ammunition from the British traders. This trade began among the Sioux about 1765, and a few years after that date we find the Sioux terrorizing the Village tribes on the Missouri.

The sites near Bad River that are probably Arikara are, as far as I can learn, the following:—

1. "Ancient Indian Village," on the west bank of the Missouri, sixteen miles below Bad River and one mile below East Medicine Knoll Creek. This site is so marked on Missouri River Commission map, Sheet XL.

2. "Ancient Indian Village," marked on the same sheet one mile above East Medicine Knoll Creek on west bank of the Missouri.

<sup>1</sup>Perhaps early in the seventeenth century, for the Omaha and Ponca state that when they reached the Missouri, certainly long before the year 1700, the Arikara were already there.

There does not appear to be any trace of early Arikara residence in northern Nebraska. Lewis and Clark mention a "Pania" village site on the Niobrara River, and some have supposed this to be an Arikara village, but this is clearly an error, for which Evans is responsible. On Evans' map the modern Ponca River is set down as Pania River and the Ponca village is set down as Pania village; hence Pania Island in the river near this village and Pania House, sometimes called Pawnee House, on the east bank near Randall, South Dakota.

The Arikara are spoken of by La Harpe, 1719, who places them on the Missouri 120 leagues south southeast from "seven famous villages," which may have been the Mandan villages of the old Heart River group. The distance given, 120 leagues (300 miles) would, counting from Heart River, place the Arikara some 20 miles below Bad River, where they probably were located at that time. La Harpe also speaks of the Arikara relations with the *Padouca*, a people whose southern bands lived in western Kansas and Nebraska at that period, and whose northern bands, known as the Gens du Serpent, were in contact with the Arikara and other tribes on the upper Missouri.

Renaudière, 1723, places the Arikara ten leagues above the Omaha, with whom they were allied, but his location of the Omaha is not definite enough to enable us to locate the Arikara villages.

At this early period the Arikara, like their kinsmen, the Pawnee, were captured and sold into slavery by the tribes on the Mississippi as well as those in the plains. Thus Charlevoix had a Pani-Ricara slave, evidently purchased on the Mississippi, and Mallet in 1739 found Arikara slaves among the Padouca and *Itan* on the New Mexican frontier. [De la Harpe, Bénard, *Relation du Voyage de Bénard de la Harpe. Découverte faite par lui de plusieurs Nations situées à l'ouest*, in Margry, Pierre, *Découvertes et Etablissements des Français dans l'ouest et dans le sud de l'Amerique Septentrionale* (1614-1754). *Sixième Partie. Exploration des Affluents du Mississippi et découverte des Montagnes Rocheuses* (1679-1754), Paris, 1886, 292-293. See also Mallet, in Margry, *ibid.*, and Charlevoix, P. F., *History and General Description of New France*, vols. 1-6. New York, 1866-1872.—George E. Hyde.

<sup>2</sup>Margry, *ibid.*, vol. 6, 598-611.

<sup>3</sup>*Collections, Missouri Historical Society*, vol. 4, no. 1, 9.

3. "Indian Village" marked on the same sheet on west bank of Missouri four miles above Bad River. This is evidently the site mentioned by Robinson, who states the site has a double ditch.<sup>1</sup>

4. "Site of Indian Village and Fort" marked on Sheet XLI on west bank of Missouri seven miles above Bad River.

There must have been other villages in this group, and some of them are probably mentioned in the South Dakota Historical Collections.

The Arikara villages near Cheyenne River appear to have been built after the Bad River group of villages was abandoned. According to Lewis and Clark there were five villages in the Cheyenne River group, but this number does not, perhaps, include all of the sites. The sites in this group as far as I have seen them recorded are:—

1. "Site of Indian Village" on Sheet XLI, on west bank of the Missouri nineteen and one-half miles above Bad River. This is clearly the first Arikara site noted by Lewis and Clark, the one on "No Timber Creek," modern Chantier Creek. On returning down the river in 1806 Lewis and Clark speak of this site as "a large village on each side." This may mean there were two villages at this place. They state this village was abandoned in 1799. This is evidently the site that Brackenridge<sup>2</sup> and Bradbury<sup>3</sup> describe in some detail.

2. "Site of Indian Village" marked on Sheet XLII, on the west bank of the Missouri near the lower point of Cheyenne Island, about five miles below Cheyenne River. This site was noted by Lewis and Clark and is evidently the first Arikara village of Trudeau, 1795.

3. The second village occupied in Trudeau's time, 100 paces above the first village.

4. Village on the south bank of Cheyenne River, at its mouth, which is marked on Sheet XLII as "Site of Indian Village and Fort." This site seems to have been noted by Brackenridge, and is marked on Lewis and Clark's map, No. 7 in Atlas.

5. "Site of Indian Village" marked on Sheet XLII on west bank of Missouri thirteen miles above Sheyenne River. Whether this was one of the group of Arikara villages or not we do not know, as the site is not mentioned by any of the early travelers.

The Arikara appear to have abandoned the last two of these villages in 1795, after Trudeau left them, for Evans in 1796 found the Arikara

<sup>1</sup>Robinson says this site is described in the *Collections*. *South Dakota Historical Society*, vol. 3, 543.

<sup>2</sup>Thwaites, Reuben Gold, *Early Western Travels, 1748-1846. A Series of Annotated Reprints of some of the best and rarest contemporary volumes of travel, descriptive of the Aborigines, and Social and Economic conditions in the Middle and Far West, during the Period of Early American Settlement*, vol. 6, Cleveland, 1914, 107.

<sup>3</sup>Thwaites, *ibid.*, vol. 5, 126.

living ten leagues below the Mandan and Hidatsa. About a year later the Arikara joined the Sioux in an attack on the Mandan and Hidatsa and then moved down the Missouri. It was evidently at this time they built the villages above Grand River, though they appear to have re-occupied some of the older villages below, as Lewis and Clark state the Chantier Creek village was occupied in 1799, and the small village on La hoo catt Island was occupied in 1797.

In 1804 the Arikara had three villages here, above Oak Creek.<sup>1</sup> The lower village in this group was abandoned soon after Lewis and Clark returned down the Missouri in 1806; but the Arikara continued to occupy the two upper villages until they were attacked by Colonel Leavenworth's forces in 1823. Aided by the Dakota, Leavenworth drove the Arikara out and practically destroyed the villages. Part of the Arikara went up and joined the Mandan, while the great part of the tribe moved south and joined their kinsmen, the Skidi Pawnee, near the upper Platte. Among the Skidi they were not welcome, because of their troubles with the whites and their raids on the Cheyenne, with whom the Skidi were at that time attempting to make peace, so the Arikara left the Skidi and established themselves near the forks of the Platte. From this point they fled in 1835 on learning that a body of United States dragoons was marching in their direction. A few years later they returned north, arriving near the Mandan village in 1838, soon after that tribe had been almost destroyed by smallpox. The Arikara now possessed themselves of the larger part of the Fort Clark Mandan village, where they remained for nearly thirty years. Leaving here about 1860, they established themselves about opposite the Fort Berthold village of Mandan and Hidatsa, and a year or so later they crossed the river and united their village with the former one.

The vanguard of the Cheyenne came into North Dakota late in the seventeenth century and built a village in the great bend of Sheyenne River. Part of the tribe remained behind in Minnesota, and they were, perhaps, the people who built the village referred to by Comfort, near the head of Minnesota River in the northeast corner of South Dakota. The Cheyenne themselves have no detailed account of their migration to the Missouri; but according to Dakota tradition, which appears to be, in the main, trustworthy, it was the Cheyenne band that had lingered behind in Minnesota that first reached the Missouri. These people first built a

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<sup>1</sup>The villages above Grand River must have been built after the Arikara abandoned their villages near Hensler, North Dakota, allied themselves with the Sioux and attacked the Mandan and Hidatsa. These events occurred in 1796 and 1797, and the Arikara abandoned the Hensler villages in 1799, according to Clark.

village on the Coteau du Missouri, near the present town of Kulm, whence, after a short sojourn, they moved to the Missouri and built a village on Porcupine Creek, between the Arikara and the Mandan, about 1740. The other band of Cheyenne was driven from their village on Sheyenne River, and moving across the Missouri, built a village on the site of the present Farm School, below Fort Yates. During the eighteenth century the Cheyenne, according to the Dakota, built at least four important villages on the Missouri: one near the mouth of the Little Cheyenne, one at the Farm School, one between Fort Yates and Porcupine Creek, and one on Porcupine Creek. All of these villages appear to have been abandoned by 1780, the tribe moving out toward the Black Hills and adopting the life of roving hunters. Part of the people, however, continued to plant corn down to about the year 1800 and, according to the Dakota, the Cheyenne maintained a settlement on Grand River, to which they returned after their hunts. Here they had their fields and a number of small earthlodges.

The Mandan are perhaps the oldest dwellers in the Missouri Valley in this region. According to their tradition, they reached the Missouri at the mouth of White River, in South Dakota, at a very early date, led by a great culture-hero chief, Good-Furred-Robe. Thence they moved up to Bad River, made a journey west to the mountains, and came back down White River, or Sheyenne River. Here part of the tribe remained, the rest moving up to Bad River again. This division gradually lost touch with the other one, which finally disappeared.<sup>1</sup> On Bad River the Mandan had their fields and were living prosperously when they were attacked by their first enemies, the Grass People.<sup>2</sup> After the first battle, the Mandan chief introduced several of the war ceremonies and societies. From Bad River the tribe gradually moved upstream, with

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\* This reminds one very strongly of the Omaha-Ponca tradition. These two tribes (then one people) reached the Missouri between the Niobrara and White River at an early date. They moved up above White River and there crossed the Missouri. The Ponca moved out to the mountains and remained for some time, then rejoined the Omaha at the mouth of White River. As the soil at this point was not very good, the people now moved down the west bank of the Missouri into Nebraska. All of this occurred before 1700, apparently, as the French sources show that the Omaha were in Nebraska soon after that date. During this earliest period the Omaha-Ponca people are said to have had the common name Honga.—George E. Hyde.

<sup>2</sup> Grass People, or Vegetation, or Herbage People. According to a Mandan story the Mandan found enemies in their land first at Bad River. Here they found a woman killed by some enemy while working in her field. They prepared and went out to find and fight the enemy, defeating them, and from the conflict, the creek was choked with corpses, hence, Bad River. The survivors of the enemy turned themselves into grass or other herbage, and so made off and escaped. So the Mandan called them Grass People or Herbage People. They afterwards came to know them to be the people who call themselves Dakota.—M. R. Gilmore.

long stops at different points, finally reaching Heart River,<sup>1</sup> where they built many villages and dwelt for a very long time. At Heart River the Hidatsa came to them, and here they were first visited by the whites: Vérendrye<sup>2</sup> and his party, 1738-1739.

It seems well to go into the movement of the Mandan rather carefully, taking into account the various items of evidence of different kinds which we have, comparing these items with such information as we have from the Indians themselves, and with the known existing sites. The written evidence is contained in the accounts of their various early visitors, more especially Alexander Henry, Lewis and Clark, and Maximilian. In comparison of these accounts, however, much caution should be used in treating the distances given by the various travelers. The land along the Missouri River is subject practically to a double set of measurements which vary widely in many cases, depending upon whether the reference is made to river channel distances or to straight line distances across the river bottomland. Thus, the present distance from Hensler to Mandan Lake is about five miles by road while by river it is nearly twice that far. From this it will be seen that distances as stated by travelers may be correct from one viewpoint, and absolutely incorrect from another.

Let us now try to trace the more or less historical epoch of the Mandan. In 1773, according to Mackintosh,<sup>3</sup> they were still flourishing in the Heart River region, having nine to thirteen villages on the two sides of the Missouri with many thousands of warriors. Soon after 1780, however, they were severely attacked by the smallpox. The Dakota or Sioux, discovering the plight of their neighbors, then attacked them and destroyed two large villages on the east side, the largest being known as Ruptare. From this great village two men, one known as Fire and the

<sup>1</sup>I have just found what appears to be the earliest reference to the Mandan villages in the Heart River group. La Harpe in 1719 visited the village of some Caddoan Indians on the Canadian River in Oklahoma and was given the following information:—

"That the Padoucas were a numerous nation whose villages extended very far toward the N. and N. W.; that the Spaniards were not allied [i.e., in contact] with all this nation, and that when they went to trade with some distant village on the side of the Aricaras ('village escarté du coste des Aricaras'), they were often attacked by the Panis, enemies of the Padoucas. . . . That there were seven famous villages on the N.N.W. side of the Aricaras at a distance of 120 leagues, with whom they are allies. I believe the Aricaras were part of the 45 Panis villages." (Margry, *ibid.*, vol. 6, 292-93.)

A French league is about 2½ miles; 120 leagues equal about 300 miles. Bad River to Heart River according to Lewis and Clark's distances is 267 miles.

Vérendrye says the Mandan had six large fortified villages: Bougainville (*Mémoire sur la Nouvelle France* (1757), quoted in a footnote in Maximilian, Prince of Wied, *Travels in the Interior of North America*, Thwaites edition, vol. 2, 235) says there were seven. Lewis and Clark usually say six and then add nine in italics.

Big White told Clark in 1806 that there were seven villages when he was born in the Fort Lincoln Village about 1757 (*Original Journals of the Lewis and Clark Expedition*, New York, 1904, vol. 5, 346).—George E. Hyde.

<sup>2</sup>Report on the Canadian Archives, note A, no. 1.

<sup>3</sup>Quoted in Schoolcraft, H. R., *History, Condition and Prospects of the Indian Tribes of the United States*; collected and prepared under the direction of the Bureau of Indian Affairs, vol. 3, Philadelphia, 1854 (253).

the other, Belt, were the only survivors. The story of these two old men is still clear in the memory of James Holding-eagle who received it from his grandfather Moves-slowly, Mandan corn priest. Moves-slowly had it direct from the men themselves in his youth.

The surviving people on the east side now determined to move up river, and they established a village on the east side a short distance above Painted Woods and nearly opposite Sanger. Joseph Packineau<sup>1</sup> of Elbowoods recently gave the information that this site is still in existence.

Prior to this first move of the east side Mandan the Arikara had apparently been routed by the Sioux, and had gone up river and established themselves in two villages near the present Hensler, one to the southeast, the Greenshields site, and one about one mile north of Hensler on the bench.

The west side Mandan, now also diminished by smallpox, then decided to move and probably established the several villages in the vicinity of Sanger although one of these was at some period inhabited by the small Amahami tribe. Shortly after this, the east side people seem to have been again attacked and defeated by the Sioux. A vague tradition says that they then built the Scorched Arrow village at the mouth of Turtle Creek just below the present Washburn. There is, however, also a tradition to the effect that this was an Arikara village. No site can now be found at this point. If the Mandan stopped here at all the stay was short, and they soon moved up to Elm Point, just above the little area of Bad Lands and almost directly east across the river from the present Stanton, as well as about three miles diagonally across the river from the later location of Fort Clark. Here they built two villages, one about a mile above the other. These are both described by Alexander Henry,<sup>2</sup> although the upper one had been very recently abandoned at that time. These two villages were occupied until 1803 when the upper village coalesced with the lower one. Henry, as already mentioned, found them thus in 1804, and so did Lewis and Clark.<sup>3</sup> Recent information obtained, shows that both these sites are still plainly marked and they will be visited in the near future. Shortly after 1805 the Ruptare or *east* side people moved over to the *south* side, and established still another

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<sup>1</sup>Packineau appears to be a corruption of the French name Patineau, his French ancestor.—M. R. Gilmore.

<sup>2</sup>Henry, Alexander, and Thompson, David. *New Light on the Early History of the Great Northwest*. Edited by Elliott Coues. New York, 1897. (vol. 1, n. 323).

<sup>3</sup>Lewis, Meriwether and Clark, William. *History of the Expedition under the command of Captains Lewis and Clark to the Sources of the Missouri thence across the Rocky Mountains and down the Columbia River to the Pacific Ocean performed during the years 1804-1806*. 4 vols. Edited by Elliot Coues. New York, 1893. (Vol. 1, 179 seq.).

Ruptare village some three miles above the Fort Clark site, near the present Deapolis. Here they still dwelt when visited by Maximilian and Catlin, and until the great smallpox plague of 1838 almost destroyed the tribe.

Meantime the west side people had also gradually continued their progress northward. From the vicinity of Sanger they moved up to a point a short distance below the Arikara villages and built a village, now identified as the Bagnall site. Either at or just prior to this time the Arikara had gone back down river. Several years later, in 1796 the Arikara returned to the old villages here for a brief sojourn, and found that the Mandan had moved on about three or four miles above them. This, according to direct line measurements, placed the Mandan in the vicinity of Mandan Lake where we have two sites now, close together on the east bank of the lake, and traditions of a large winter village in the timbered bottom below.

Apparently some trouble was experienced with both the Arikara and the Dakota while at Mandan Lake, and as the location did not lend itself well to defense another move was soon made. On this occasion two villages were again built, one probably at the present *Fort Clark Station*,<sup>1</sup> and another one on a promontory overlooking the river, about a mile or a little more above. This latter site is the historic Old Fort Clark Mandan village. From archæological evidence and tradition it is clear that the lower site here existed as a village for only a very short time, and was soon merged into the larger one. The old Fort Clark village like Ruptare some three miles above it also survived till the smallpox of 1838. After this, the few survivors joined the Hidatsa, but some of the women remained in the old village with the Arikara. When the Hidatsa finally moved to Fort Berthold the remaining Mandan accompanied them and settled there with them in the last village built.

The Hidatsa, of kindred stock with the Mandan, but widely divergent in language and culture, claim to have come from under the ground, reaching the surface of the earth in the vicinity of Devil's Lake. The Crow were at that time a part of the Hidatsa. After emerging they built a large village near the lake and lived there for many years. At length four of their hunters, journeying westward, came upon the Missouri and saw the villages of the Mandan on the opposite bank. They talked with the Mandan, received a present of corn, and declared that they would return with their people in four days. This occurred near

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<sup>1</sup>Arikara tell me that they had a village exactly where Fort Clark Station now is.—M. R. Gilmore.

the mouth of Heart River.<sup>1</sup> The four days lengthened into four years, and at the end of that time, a vast host appeared opposite the Mandan village at old Fort Lincoln, and were ferried over in bull-boats by the Mandan.

The Hidatsa built a village near the Mandan and remained there for many years, learning corn-growing from the Mandan. There also the quarrel took place which resulted in part of the Hidatsa separating from the rest and moving westward. These people were the Crow of later times. The vicinity of Heart River becoming over-populated, at the suggestion of the Mandan chief, and by mutual agreement, the Hidatsa moved up to Knife River, whether in one move or by gradual stages is not told. Thereafter Knife River remained the seat of the Hidatsa, until the final removal to Fort Berthold, although a number of temporary movements were made by different segments of the tribe which resulted in the establishment for short periods of a number of villages farther north along the river. These we shall consider later. The last movement of this kind was made by the band of Crow-flies-high, after the tribe reached Fort Berthold, to a site near Fort Union, where the band remained many years, not returning to the reservation until about 1890.

The Amahami were apparently very closely related to the Hidatsa, with whom they lived for a great many years. According to tradition, they started originally from the shore of an eastern sea. Thence they went northward to a timbered country through which they traveled for a long time. When they finally emerged from the timber, somewhere south-east of Fargo, North Dakota, they built a large village and remained a long time. One day a party of hunters met some Hidatsa, and both parties were surprised that they were able to understand each other. The two tribes dwelt in close friendship and association for many years; when the Hidatsa moved to the Mandan country the Amahami soon joined them there. After that whenever the Hidatsa moved, they moved too. One tradition states that they lived in one of the villages near Sanger for a time.<sup>2</sup> Early white travelers found them in a village south

<sup>1</sup>Clark, W. P., in the *Indian Sign Language* (Philadelphia, 1885) states that when the Hidatsa came to the Mandan the Arikara still lived below Fort Pierre. Their arrival was therefore probably before 1770, but the younger V'rendrye is supposed to have met the Crow (Beaux Hommes) west of the Missouri in 1742.

These Beaux Hommes are probably the same people that Joseph La France states were living about 1740 in the plains west of Red River, and east of the Missouri (La France, quoted in Hobbs, *Hudson Bay*, 1744). The Beaux Hommes of La France may have been a rear guard that lingered behind after the advance body of the people had passed beyond the Missouri. As the V'rendryes were near Lake Winnipeg before 1740, they must have known the people La France calls Beaux Hommes in their old home near Red River. La France is certainly trustworthy—his account of all the tribes near Red River, Lake Winnipeg, Assiniboin River, etc., is quite accurate.—George E. Hyde.

<sup>2</sup>October 23, 1804, Lewis and Clark camped on the west bank just below Pretty Point and noted just before camping an old village site of the Amahami on the north or east side of the river, evidently between one and two miles below Pretty Point. (*Original Journals*, vol. 1, 203.)

This village would be below the Mandan villages, where they lived prior to the destruction of their eastern village about 1793.



of Knife River, close to the Hidatsa. They were at that time very few in number and soon after became entirely incorporated into the Hidatsa tribe.

#### VILLAGE SITES LOCATED.

Having roughly sketched the story of the tribes who play a part in the archæology of the region, let us next make a summary of all the village sites so far located, in one way or another. All sites reported will be listed and a short sketch will be given of those which have been personally observed. The sites will be taken in order, proceeding up the Missouri from Grand River.

*Grand River Arikara Sites.* The first sites are the old Arikara villages above Grand River and a little above Oak Creek. These villages were occupied by the Arikara when Lewis and Clark visited them, and intermittently for many years thereafter. The first of these villages was on an island (modern Ashley Island) three and a half miles above Oak Creek; four miles above this island village were the two upper villages on opposite banks of a small creek which runs into the Missouri from the west.<sup>1</sup> We have not visited these sites and there does not seem to be any printed description of them as they appear today.

There are reported to be a number of other Arikara sites in this neighborhood, along the Missouri and extending a considerable distance up Grand River, but the exact number and location is still unknown, as far as any accessible account is concerned.<sup>2</sup>

<sup>1</sup>The third or upper village of this group is shown on the Missouri River Commission maps, on Sheet XLV at mile 515 as "Ancient Indian Village." The other two villages of 1804 are not shown on this sheet.

<sup>2</sup>There are along the Missouri, both above and below Grand River, a number of old village sites, most of which may be considered as belonging to the Grand River group of Arikara villages. These sites are as follows:—

1. Village of eighty lodges on the west bank of the Missouri, 5½ miles below what Lewis and Clark term Otter Creek (present Swan Creek, Walworth County, South Dakota). Lewis and Clark state this was an Arikara village and had been occupied as late as the spring of 1804. This was perhaps a winter village.

2. Village of sixty lodges on west bank of the Missouri and south bank of Moreau River. This was a winter village, apparently occupied in the winter of 1803-1804, according to Lewis and Clark.

3. "Site of Indian Village and Fortification" marked on west bank of the Missouri, 10½ miles above Moreau River on Sheet XLV. (Not noted by Lewis and Clark and perhaps of later date.)

4. Village on Grouse Island (modern Blue Blanket Island).

5. "Site of Indian Village" marked on Sheet XLV on west bank of the river just above Blue Blanket Island. (Not noted by Lewis and Clark.)

6. First Arikara village of 1804, on modern Ashley Island, 3½ miles above Oak Creek. This village was abandoned before 1811.

7. Second Arikara village of 1804, 4 miles above the island village, on west bank of the river and south bank of a small creek.

8. Third village of 1804, on the north bank of the creek, just above the second village.

9. "Ancient Indian Village," marked on Sheet XLV on the west side of the river 4½ miles above the upper Arikara village of 1804. Not noted by Lewis and Clark.

These are probably all Arikara sites, but it is not likely that more than three of them were occupied at any one time.

On Sheet XLIV of the Missouri River Commission map is marked "Indian Mounds" on the east side of the Missouri and on the south bank of Swan Creek. This is a very interesting site, if it is an Indian village. So far as known, there is no other site on the east bank between the Nebraska line and the Cannonball River with the exception of the "Buffalo Pound" village at the mouth of Big Beaver Creek, said to be Mandan, although the Dakota claim the Cheyenne formerly had a village near Little Cheyenne River.

*Cheyenne Site at Farm School.* (No. 12.) Above the Arikara villages of the Grand River group there is a stretch of river of some twenty-five miles along which no village sites are known. At the end of this stretch of river we come to the site of the first old Cheyenne village, at the Farm School, on the Standing Rock Indian Reservation. We have not visited this site. According to Dakota tradition this village was built by the band of Cheyenne who came from the village on Sheyenne River, near Lisbon, North Dakota. As the Farm School was built directly over the old village, the site is probably almost obliterated.

*Blackfoot Creek Site.* Some three miles north of the Farm School, on the west side of the Missouri and on the south bank of Blackfoot Creek, is a site which was recently shown to Captain A. B. Welch of the U. S. Army by some of his friends among the Sioux, who stated that this was an old Mandan village. This site is also marked on the Missouri River Commission maps, Sheet XLVI, as "Ancient Village."<sup>1</sup>

*Slob Town and Porcupine Creek Cheyenne Sites.* (Nos. 13 and 45.) On October 14, 1804, Clark states:—

Immediately opposit our Camp on the L.S. I observe an antient fortification the walls of which appear to be 8 or 10 feet high (*most of it washed in*).

This site was on the west bank of the Missouri, below Four-mile Creek and near Fire Heart Butte, as nearly as can be judged. If there is a village site in this neighborhood, we have failed to find any trace of it.

A little less than two miles below Porcupine Creek, on the west side of the river, is a site (No. 45) which was recently located by Dr. George Bird Grinnell. This is, according to Dakota tradition, an old Cheyenne village. Above here, on the south bank of Porcupine Creek, is the best known of the Cheyenne village sites on the Missouri.<sup>2</sup>

Dr. A. McG. Beede, formerly Episcopal missionary at Cannonball, advised the writer, who had determined the position of this Porcupine Creek village some years ago, that the river had left no traces of the site.

<sup>1</sup>*History of the Lewis and Clark Expedition*, vol. 1, 166.

<sup>2</sup>It seems to be impossible at the present writing to reconcile the statements made by various persons as to the Cheyenne villages along this part of the river. Dr. Grinnell heard of several traditional sites along here and visited three of them: the Porcupine Creek site, the site about two miles below Porcupine Creek, and the Farm School site. The Dakota claim there were other Cheyenne villages in this neighborhood.

Lewis and Clark passed along this part of the river on October 15th and 16th, 1804, and their camp on the night of October 15-16 appears to have been about a mile below the Porcupine Creek site. They state that they passed an old Cheyenne village on the west side of the river just before they camped for the night on October 15. This would appear to be the village Dr. Grinnell found, about two miles below Porcupine Creek. To add to the confusion, Ordway in his journal states that an old Cheyenne village was passed on October 15th some distance below camp. He states that after passing this village they passed a creek on the west side of the river, timbered bottoms on both sides of the river, and another creek on the west side, just above which they camped on the east bank. On the next day, October 16th both Clark and Ordway state in their journals that a second Cheyenne village was passed. This was apparently the site on the south bank of Porcupine Creek. From these journals it would appear that there were three Cheyenne villages, one, seen only by Ordway, some two miles below Fort Yates, and two others near Porcupine Creek. See Lewis and Clark, *ibid.*, 166-169 and the *Journals of Lewis and Ordway*, (*Collections, Wisconsin Historical Society*, vol. 22, 154, 155).

Dr. Grinnell, however, finds that the whole village is intact and the lodge rings very plain. This is the village built by the first band of Cheyenne to reach the Missouri from Minnesota according to Dakota tradition.

*Buffalo Corral Site.* The next site occurs on the east side of the river and a few miles higher up. It is that above the mouth of Beaver Creek, in Emmons County, North Dakota. This village is somewhat vaguely credited to the Mandan and is called the Buffalo Corral Village, as it is said that a long-remembered killing of buffalo by the pound method once occurred there.

*Cannonball Site.* (No. 14.) The next located site is on the high bluff marking the confluence of the Cannonball River with the Missouri. This site is on the northwest edge of the town of Cannon Ball and in area is fairly large. It appears to show at least two occupations, one over the other, and apparently was surrounded by several different ditches.

This site, as suggested by the Dakota, may be at least partly Mandan, and its size may be explained by supposing that this is the village at which the three tribes—Cheyenne, Arikara and Mandan—united for a year or two, for mutual protection from the Dakota, as is set forth in the traditions of several tribes.

In this vicinity, a short distance southwest of the site, is a hill known to the Dakota as 'the Holy Hill of the Mandans.' The reticence of the Mandan themselves with regard to this site is quite striking, and an explanation of it would be interesting.

*Old Site not Visited.* On the Missouri between one and two miles above the Cannonball is still another site, not visited by the writer, and not definitely credited to any tribe.

*Fort Rice Site.* (No. 15.) Again, on the west side of the river and on the southeastern outskirts of the town of Fort Rice, are the very indistinct remains of rather a large village which is now a plowed field. This site is somewhat uncertainly credited to the Mandan, according to Mr. H. C. Fish, who visited many of these sites with the North Dakota Historical Society expedition, when several of the older Fort Berthold Indians were with the party.

*Glencoe and Livona Sites.* (No. 60.) A site has been recently reported near Livona, North Dakota, on the east side.

A little higher up, on the east bank, southwest of Glencoe Post Office, and on what is known as the Shermer Place, is another site, not definitely established as belonging to any particular tribe, and two miles above it still another very indistinct site was recently found.

*Huff Site.* (No. 18.) Again, on the west side, just below the present village of Huff and on the edge of the bench, occurs another very striking site.

*Eagle's Nose Site.* (No. 43.) About two miles farther up we come to one of the most romantically situated and most interesting of any of the sites. The river along here runs south of east; a low bench extends back from the river for a variable distance, then breaks into a miniature Bad Land area and rises into the high range of hills called by Lewis and Clark the Eagle Nest Hills and reported by them to have been frequented for the purpose of catching war eagles. These hills are cut frequently by deep, timbered coulees. Perhaps two miles above Huff the bad lands come directly to the river bank, and one long and peculiarly shaped clay ridge extends to the bank in an unbroken outline, very closely resembling the beak of an eagle. This ridge plays an important part in Mandan tradition. The beak merges into the range of hills at the south; on the west of its base is a deep coulee, filled with wild fruit trees, and on the west side (of the coulee) a high promontory juts out from the range of hills, forming a flat-topped butte connected with the range of hills behind it by a narrow neck. The flat area is perhaps ten acres in extent, and the sides drop down precipitously all around except a narrow passage at the southeast, like those of a mesa in the Southwest. On the flat top of this promontory are the remains of the Eagle's Nose Village of the Mandan, very prominent in many stories and traditions, and by some said to have been built by the culture-hero, Good Furred Robe, although in this it may be confused with the Huff site. A steep path on the east side leads down to a spring, about halfway down the slope.

This village, only recently inspected, is undoubtedly the one seen by Lewis and Clark opposite and just below the point where they camped for the night on October 19, 1804.<sup>1</sup>

*Holbrook Site.* (No. 46.) About three miles farther up and on the east bank of the river is another site. This is situated on the edge of a high bluff, just below the mouth of Apple Creek, on a farm known as the Holbrook Place. This site has been described in a previous paper.<sup>2</sup>

*Bad or Red Water Site.* (No. 1.) A few miles higher, on the west side, and a mile above the mouth of Little Heart Creek, is another site, which is identified as the Bad or Red Water Village of Mandan tradition.

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<sup>1</sup>Clark says, (*Original Journals*, vol. 1, 199): "On the point of a hill, 90 feet above the lower plane, I observed the remains of an old village, (high, strong, watchtower &c.) which had been fortified, the Indian Chief with us tells me, a party of Mandans lived there. Here first saw ruins of Mandan nation."

<sup>2</sup>Will, G. F., "Some New Missouri River Valley Sites in North Dakota" (*American Anthropologist*, N.S., vol. 12, 58-60, 1910).

**Fort Lincoln Site.** (No. 2.) Proceeding a few miles farther up come to the well known Fort Lincoln site, situated at the foot of the bluff below the old infantry barracks at that post and on a gentle slope rising to the bluff edge. This site has been briefly described in a previous paper,<sup>1</sup> and is now owned by the State Historical Society. (Fig. 1.)



Fig. 1. Fort Abraham Lincoln Mandan Site (No. 2). -

**Motsiff Site.** (No. 3.) Above this site we come to the Motsiff farm, just south of the outskirts of the city of Mandan, North Dakota. Here there is a very prominent site with unusually high mounds and depressions of considerable depth. It is well known to the Indians as Big Village, or a portion of that village.

<sup>1</sup>Will and Spinden, *The Mandans*, 148. This is the site Clark calls the "1st old Mandan Village." Ordway also calls it that.

*Scattered Village Site.* In the eastern part of the present city of Mandan, considerably built-over, but nevertheless distinguishable, are the remains of 'Scattered Village' which was occupied in the summer, according to tradition, by those who had fields in the fertile bottomland close by.

According to some of the old Indians, a site is also located on the outskirts of Bismarck, about opposite the two villages above described; but if it ever was there all traces of it must have been destroyed many years ago.<sup>1</sup>

*Ward Site.* (No. 47.) The next evident site is, however, on the east side of the river, some three miles northwest of Bismarck, and on the flat top of the high bluff, just to the south of the Ward Farm and near the mouth of Burnt Creek. This site has been described with a map in a previous paper,<sup>2</sup> and is identified by some of the Indians as the village of a chief known as 'Looking.'

*Sperry Site.* (No. 39.) About four miles further north is the Sperry site, on the flat top of the high bluff and on the south side of Burnt Creek, where it emerges from the hills into the Missouri River bottoms. This site is of considerable size, and Mr. Lynn Sperry has a large collection of articles which he has found there at various times. Most of this site has been plowed, and it is at present very indistinct.<sup>3</sup>

*Boley Site.* (No. 20.) On the opposite or west side of the river, northeast of Mandan, is the Boley site, situated on the low bench edge and on the Boley Farm. It is a very well-marked site, but has been cut through by a railroad grade which destroyed a considerable part of it.<sup>4</sup> (Fig. 2.)

*Otter Creek Site.* (No. 5.) A few miles further up, on the west side, and about two miles below Harmon, there is another small and indistinct site. This is situated on a high bluff, just south of the point where Otter Creek runs into the river bottoms. It shows very shallow hut rings and would appear to have been occupied only a short time.

*Burgois Site.* (No. 40.) Almost opposite this and on the east side of the river is the largest and best-preserved of all the sites in this region: the Burgois or Double-Ditch site, which is fully described in "The Mandans" and is now held in trust for the State Historical Society.

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<sup>1</sup>Clark's statement (*History of the Expedition, etc.*, 175) agrees with this tradition. He places the "2d village of the Mandans" on the north side of the river, evidently in the southern edge of Bismarck, with another old site opposite it, in the bottoms on the south side of the Missouri.

<sup>2</sup>Will and Spinden, *The Mandans*, 148. This site was not seen by Lewis and Clark.

<sup>3</sup>Lewis and Clark did not note the Sperry site.

<sup>4</sup>Lewis and Clark noted this site. They passed it during the first course on October 22d. (*History of the Expedition, etc.*, vol. 1, 175.)

This site is considered by the Mandan to have been one of their old villages, and they know it by the name of "Yellow Village" or "Yellow Clay Village."

*Larson Site.* (No. 41.) About four miles further north, on the same side of the river, is the Larson site, which is also described with a map in "The Mandans."

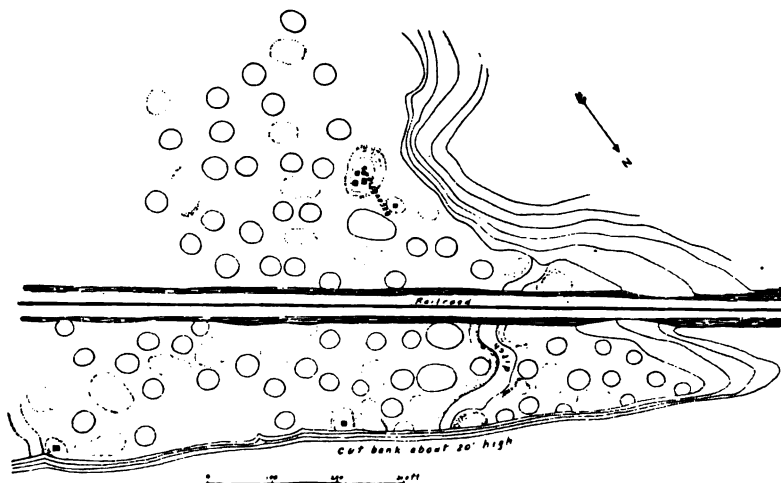


Fig. 2. Boley Mandan Site (No. 20).

No other villages have been located on the east side of the river, until the Knife River is reached, although further exploration might reveal other sites. One has been reported on the south side of Turtle Creek at its emergence into the river bottoms, but it is no longer possible to locate the site with any certainty.<sup>1</sup> Another has been recently reported north of Painted Woods.

<sup>1</sup>We have now passed all of the sites of the old Heart River group. Clark describes this group as made up of nine sites along a stretch of twenty miles of river, beginning with the First Old Mandan village at Fort Lincoln and ending at a point near Harmon. He locates three of these sites on the east and six on the west bank. Including all the sites mentioned by Clark and those known today, we have along this twenty mile stretch the following sites: 1. Fort Lincoln site; 2. Clark's site on east bank south of Bismarck; 3. Big Village, opposite No. 2; 3. Scattered Village; 4. Clark's site in the northern part of Bismarck; 5. The Ward site; 6. The Boley site; 7. The Sperry site, not seen by Clark; 8. Clark's site on west bank two miles above the Boley site; 9. The Burgois site; 10. Site on the east bank two miles above the Burgois site (Clark saw this or the Burgois site); 11. Clark's site on the west side at the mouth of a large creek, evidently the Otter Creek site below Harmon; 12. The Larson site. Besides which there are about five other Mandan sites below Fort Lincoln, making nearly nineteen sites that we might include in the Heart River group.

This is by far the greatest group of village sites along the upper Missouri at any one place. I set down on a map every site mentioned, from the northern line of Nebraska to a point just above Knife River. There are eighty-two sites, and the Mandan sites from near Eagle Nose Village to Harmon make up just about one-fourth of this total number.—George E. Hyde.

On the west side of the river the Square Buttes come down as a rough barrier to the river a short distance above Harmon. They rise abruptly from the river's edge and present few locations for a village; and no sites are found on this side until we come some distance higher up.

*Molander Site.* (No. 25.) The first site seen above the Square Buttes is the Molander site, situated on the Molander Farm, some two or three miles above the present station of Price. This site lies back from

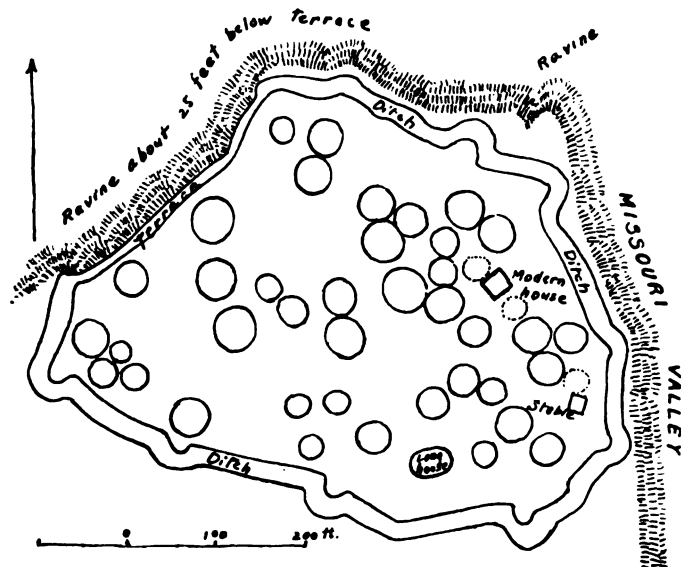


Fig. 3. Map of Molander Site from St. Paul Pioneer Press, about 1883 (No. 25).

the edge of a rather high bench just south of a deep coulée full of water-holes. It has been very little disturbed and is in excellent condition. The ditch about the site is arranged with angles jutting out at regular intervals and completely surrounds the site. A low ridge of earth follows the ditch on the inner side and the interior has a large number of very plainly marked house rings. At the foot of this bluff, on the east, is a low, narrow bench, not over twenty feet above the level of the bottoms. On this are signs, considerably obliterated by cultivation, of a supplementary village, perhaps occupied in conjunction with the upper one. (Figs. 3, 4).

*Pretty Point Site.* (No. 7.) A few miles above this place we come to the high bench point, jutting out into the river, known to rivermen and



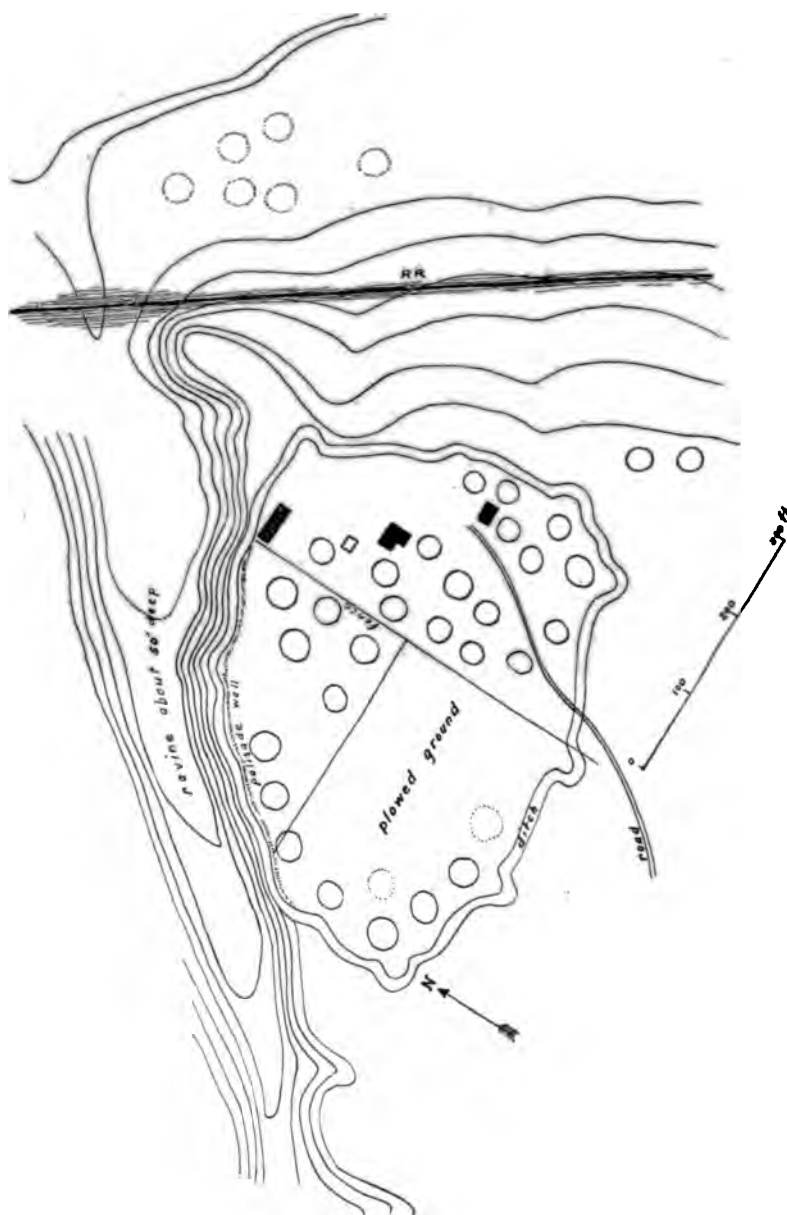


Fig. 4. Molander Site (No. 25).

marked on river maps as Pretty Point. On the very end of this point are the evidences of what was apparently a small and not very permanent village. The number of house rings is small, and there are no traces of a ditch. The cutbank to the river, however, shows a number of old caches.

*Smith Site.* (No. 26.) At the north base of Pretty Point is located the Smith Place, and just to the north of it on the bench edge are the remains of another site apparently divided into two parts by a deep coulée. This site has been so mutilated by railroad grading as to leave few clues as to its original condition.

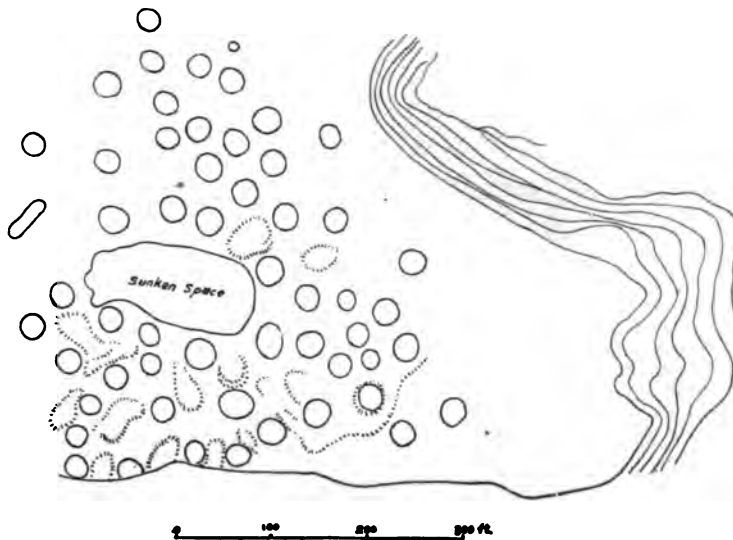


Fig. 5. Lower Sanger Site (No. 8).

*Lower Sanger Site.* (No. 8.) The next site is about two miles farther up and about one mile below Sanger, North Dakota. It is of medium size, fairly well marked, with a rather indistinct ditch around it and a number of mounds three to six feet high scattered among the house rings. The site is located on a flat-topped bluff just south of a deep coulée with water-holes. (Fig. 5).

*Upper Sanger Site.* (No. 9.) On the north edge of Sanger village and partly occupied by the River Elevator is the Sanger site. This is on the high bench which falls off directly to the river. Most of the site is very distinct and it is on a rather uneven piece of ground. The mounds are numerous and of considerable size and elevation. (Fig. 6.)

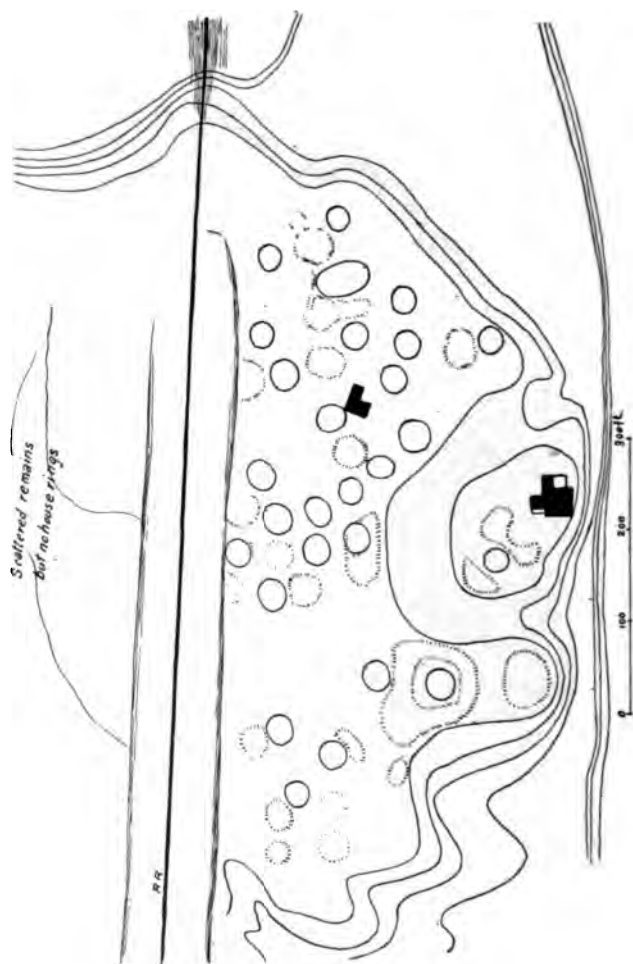


Fig. 6. Upper Sanger Site (No. 9).

Just to the north across the coulée are further remains, not distinct enough to indicate any permanent village, but apparently a place where a number of lodges had once been built.

The next group of sites brings us nearly to the Knife River region. There are three in the vicinity of Hensler, North Dakota, all of which are mentioned by Lewis and Clark.

*Bagnall Site.* (No. 48.) The first of these, the Bagnall site, is about five miles above Sanger. There are no distinguishable sites between these two points, but along the bench edge bone fragments and broken pottery occur very frequently. This site is on the edge of the low bench which slopes up toward the northwest to a round knoll. It is entirely surrounded by a wall and ditch and shows very well marked house rings; but there are no very great elevations or depressions.

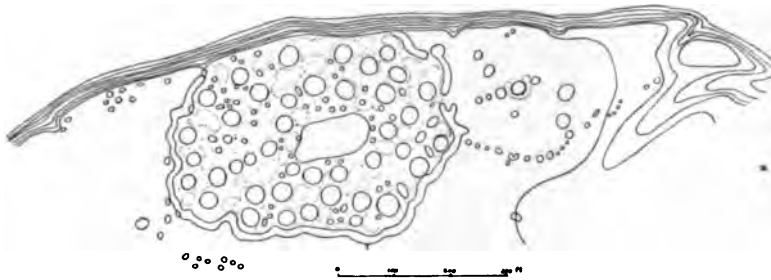


Fig 7. Greenshield Site (No. 28), probably Arikara.

*Greenshield Site.* (No. 28.) To the east of Hensler the bench rises to a high bluff on the Greenshield Place, and at the end of this bluff, about one and a half miles from Hensler, is a large and well-marked site with a wonderful outlook over the Missouri bottoms and up and down the river for many miles. It lies between two deep draws and is surrounded by many depressions, resembling old Arikara graves. There are also traces of what must have been an early trading-post. (Fig. 7).

*Hensler Site.* (No. 27.) Almost directly north of Hensler, on the edge of the level bench and about one mile distant, is the third site of this group. It is also very well marked, surrounded by a low ridge and shallow ditch, and showing no great depth or elevations.

These sites evidently constitute the three villages—one Mandan (the Bagnall), and two Arikara (the Greenshield and Hensler sites), mentioned by Lewis and Clark.<sup>1</sup>

<sup>1</sup>*History of the Expedition, etc.*, vol. 1, 177.

These Arikara villages were evidently occupied more than once. Thus the Mandan tradition states that the Arikara moved up to this locality before the smallpox of 1780. They came up here again in 1795 and 1796 and abandoned the villages in 1799. In the spring of 1805 they moved up to these villages again, but the Mandan and Hidatsa evidently were opposed to having the Arikara near them and refused to consent to their occupation of the old villages.

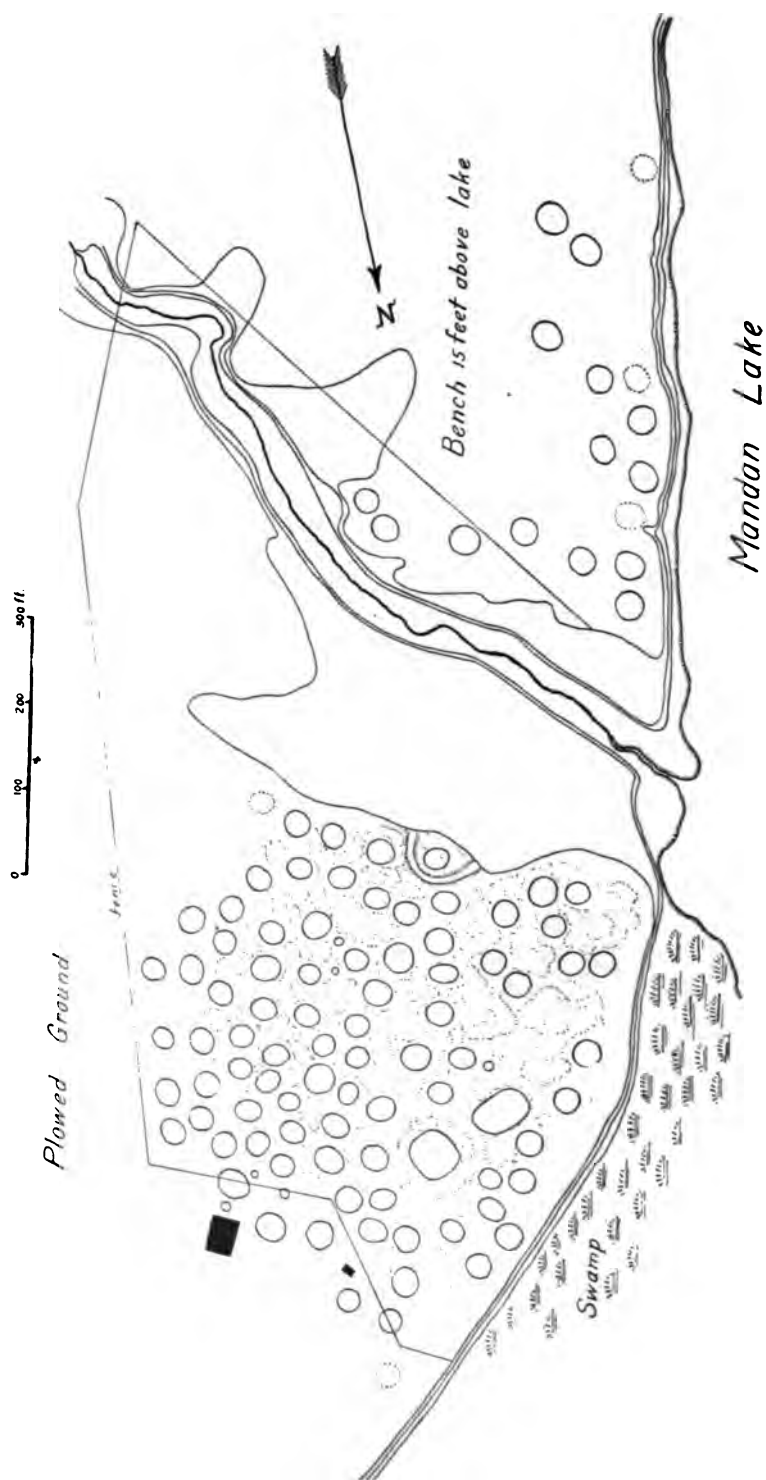


Fig. 8. Mandan Lake Sites (No. 29).

*Mandan Lake Sites.* (No. 29.) The next sites are some four or five miles above, on the bench along the east side of Mandan Lake. There are apparently two large sites here, divided by a deep draw or washout which extends back into the hills to the south. These two sites are well marked and abound in flint, finished artifacts, partly worked pieces, and unworked fragments. (Fig. 8).

*Fort Clark Station Site.* (No. 10.) Three or four miles above, and on the east edge of the present village of Fort Clark, is a double site, divided by a ravine and situated close to the edge of the bench. The area is not extensive, nor are the rings and mounds well marked. As near as can be judged, Lewis and Clark state that this was the location of the Mandan when the Arikara came up to build in their vicinity.

*Old Fort Clark Site.* (No. 11.) About one and a half miles farther up is the famous old Fort Clark site, built by the Mandan and occupied by them when Henry, Lewis and Clark, Maximilian, and Catlin visited them, and taken over by the Arikara after 1838 and used by them for many years. This site is in excellent condition and has been several times mapped. Perhaps the most interesting of these maps is one made by the Indians of the Fort Berthold Reservation and giving the names of the occupants of many of the old lodges. The site of the old trading-post here is very easily located even today. This site is now owned by the State Historical Society.

*Fort Mandan Site.* (No. 49.) Almost opposite here, on the east side of the river, was the village occupied by the Mandan in 1804, which is still in fair preservation, according to a recent report.

*Deapolis Site.* (No. 30.) A few miles farther up on the west side is the site of the Mandan Dupla or Ruptare. This is on the river bank close to the Deapolis River Elevator. It is in excellent condition, and is now owned by the State Historical Society.

*Small Site recently Obliterated.* (No. 31.) Two or three miles higher up, on the edge of the high bench, a small site was located and photographed by Mr. H. C. Fish and the writer some ten years ago. Railroad work has since obliterated it, but it very evidently marks the place mentioned by Boller<sup>1</sup> to which a few Mandan returned from Fort Berthold for some years.

*Amahami Site.* (No. 32.) We now come to the well-known Knife River Hidatsa sites. The first of these is on the edge of the bench on the outskirts of Stanton village and is partly enclosed in the courthouse

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<sup>1</sup>Boller, Henry A., *Among the Indians. Eight Years in the Far West: 1858-1860. Embracing Sketches of Montana and Salt Lake.* Philadelphia, 1868. (321.)

grounds. This site is well marked, level, and rather less encumbered with mounds and depressions than most of the sites. This was the old village of the small Amahami tribe.

*Lower Hidatsa Site.* (Nos. 33-34.) Nearly a mile farther up, and on the south side of Knife River, where it debouches into the Missouri bottoms, is the first Hidatsa site. This site really consists of two separate

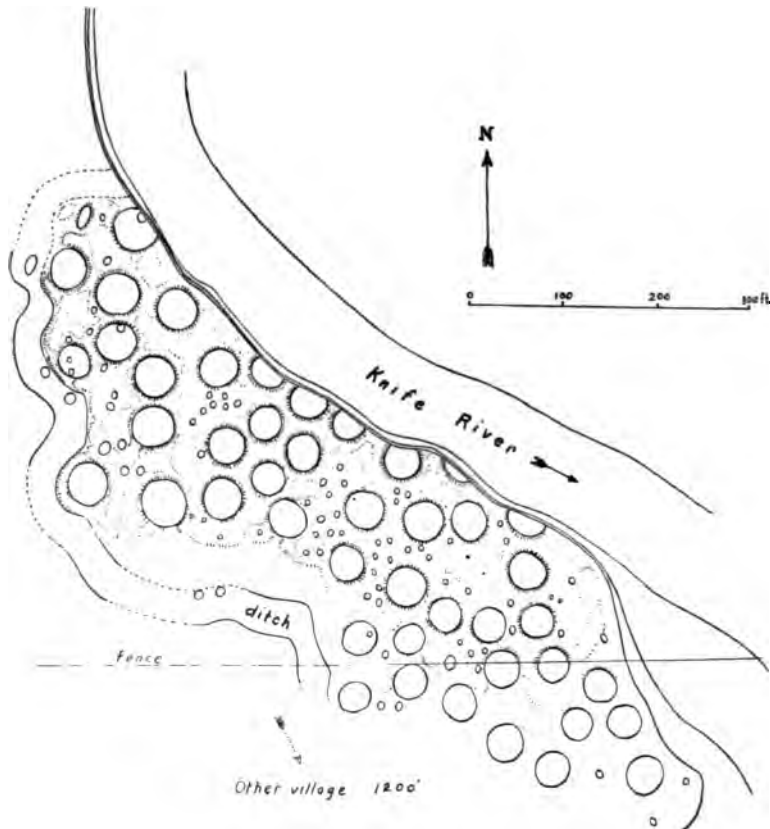


Fig. 9. Upper Portion of Second Knife River Hidatsa Site (No. 33).

and distinct parts, one being on the bank, the other to the southwest and somewhat back from the river. It is considered by the Hidatsa, however, as only one village. The elevated road from the Amahami village to this one, mentioned by Henry, is still very clearly defined. The sites themselves, judged from the height of the mounds and the depth of the rings, apparently show very long occupancy. (Figs. 9 and 10.)

*Big Hidatsa Site.* (No. 35.) On the north side of Knife River and on the edge of the bench which slopes up at the back to the hill where the Hidatsa sun dance was formerly observed, is the great Hidatsa village site. This is on land owned by Mr. Olds, is a very large site, and is marked by very deep house rings and many mounds.

*Energy Site.* (No. 51.) About six or seven miles further up the Missouri, and on the east bank, near the site of the now abandoned Energy

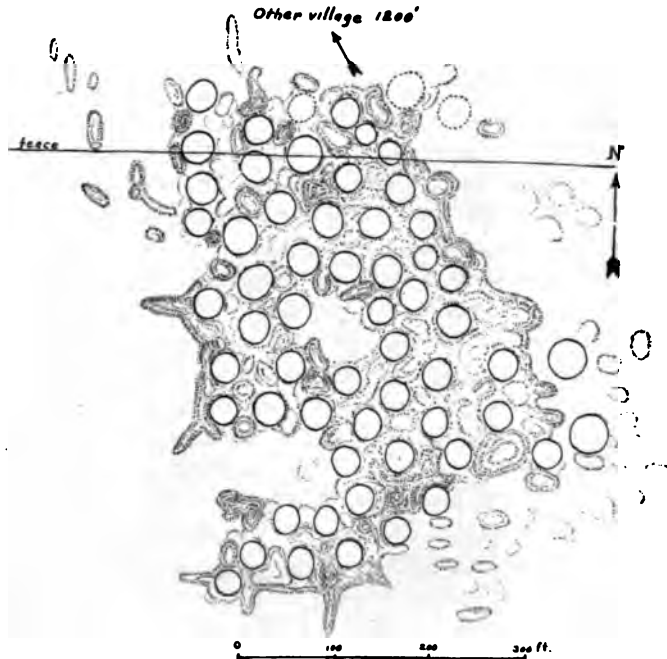


Fig. 10. Lower Portion of Second Knife River Site, Hidatsa (No. 34).

Post Office, is another site, presumably Hidatsa, concerning which we have no very definite information.

*Mannhaven Site.* (No. 52.) A few miles above, on the south side, and just above Mannhaven, is another site, claimed by the Hidatsa. This site was doubtless affiliated with the winter village site across the river on the north side, near the mouth of Wolf Creek, mentioned by Henry, but now quite obliterated.

Somewhere in this locality was the Red Springs and the winter village of the Arikara, frequently mentioned by Boller, but not yet identified.



*Rock Village Site.* (No. 53.) Still further up, and again on the south side, is the site of the Hidatsa "Rock Village." This site is just above Expansion village and takes its name from Emanuel Rock in the river at that point, an object well known to all rivermen and named after Manuel Lisa who for a short time maintained a trading-post somewhere in the vicinity.

*Last Arikara Sites.* (No. 54-55.) Still further up, just above the river elevator at Ree, is the first of the two Arikara sites, built by that tribe and occupied for about a year before they crossed the river and built near their allies at Old Fort Berthold. These sites are separated by less than a mile, show very short occupancy, and are exactly opposite the old Fort Berthold site. Tradition says that certain of the best criers could converse between the two sites with the river separating them.

*Old Fort Berthold Site.* (No. 56.) The old Fort Berthold site is still in good condition and requires no description, as there are many printed accounts that give full information about it.

Above old Fort Berthold there are several sites, all of which are ascribed to the Hidatsa, which were probably built by wandering bands from the Knife River seat of the tribe. Most of these sites have not been personally inspected, but they are said to show signs of only very brief occupancy.

*Bad Lands Site.* (No. 59.) The first of these is about four miles below Elbowoods in the small area of bad lands, situated on the top of a high point some distance back from the river. It is said to have been ruled by a very high-handed and cruel chief and to have been abandoned as soon as his death gave the people an opportunity to assert themselves. This site has been visited recently and was found to be on the flat top of a very high, steep-sided hill, the top having an area of some two acres. There are about twenty shallow and rather indistinct rings. The odd feature of the site was the small rings, more like tipi rings, being about eighteen feet in diameter. Some bones and pottery fragments were found.

*Elbowoods Site.* (No. 57.) The second of these sites is on the west bank of the river opposite the present Indian agency at Elbowoods. It is on a high bank, not far back from the river.

An interesting story regarding this site has been recently secured, versions coming from members of both tribes concerned in the events narrated, the Hidatsa and the Dakota. The story brings in an interesting item in describing a plan of water storage, a feature concerning which practically nothing had previously been secured.

It seems that on a certain occasion the Dakota sent out a large war party to destroy this particular village, which was located on a high and very inaccessible promontory. A hunting band of the Hidatsa ranging far from home, happened to discover the war party and its object, and at once hastened home to their chief with the tidings.

The chief immediately ordered the men forth to the hunt to secure many green buffalo hides, while the women dug deep pits in the lodges. The hides were speedily brought in, and were fitted into the pits by the women. Then men, women, and children began carrying jars of water up from the river without ceasing. Just as the last reservoir was filled the Dakota appeared in the distance, and soon invested the village with the intention of reducing it through the people's suffering from thirst. There was much bitter fighting, all favorable to the Hidatsa owing to their almost impregnable situation. At the end of twelve days the Dakota decided that the people must by then have reached a very serious state and a grand assault was organized. To their surprise on launching the assault, they met a vigorous resistance in which many Dakota were killed. As a finale to the repulse the Hidatsa rolled down a number of skins full of water upon their discomfited assailants. This so disheartened the Dakota that they at once raised the siege, leaving so many bodies of dead warriors in the vicinity so the Hidatsa say, that the village had to be abandoned on account of the stench.

*Inland Sites.* In addition to this list of sites along the river, there are several sites more or less inland, some actually observed, others traditional and not yet located.

First among these is the old Cheyenne site on the great bend of the Cheyenne River, in the eastern part of the State which has been observed and mapped.

Dr. Beede of Fort Yates states that there is another Cheyenne site almost directly east from Fort Yates, some fifty or sixty miles distant, in the hills near Kulm, North Dakota. This site, so far as known, has not been actually inspected. The Cheyenne who built this village are said by the Dakota to have come from Minnesota; they halted near Kulm for but a short time, then crossed the Missouri and built the village on the south bank of Porcupine Creek, above Fort Yates.

A site, also formerly described, was seen by Mr. Joseph Taylor, a pioneer trapper, in the sand hills district east or southeast of Bismarck, North Dakota. This has been tentatively suggested as the site of the village visited by the elder Vérendrye. Careful search in recent years has failed to discover any traces of this site, and it is probable that it has been obliterated by the blowing of the sand.

Two other mound sites were reported some years ago, but so far as is known have never been investigated. Neither one can be definitely ascribed to any tribe. The first of these is said to be about twenty miles northwest of Bismarck and not far from the hill known as Sibley Butte. The second is on the west bluff overlooking a small lake, a short distance west of Turtle Lake, North Dakota.

Several years ago a site was reported in western Oliver or Mercer County, North Dakota, possibly one to which the Hidatsa retired at the time of the smallpox epidemic. Recently Dr. Libby of the North Dakota Historical Society has located an Indian site in the Knife River valley near Bemis, North Dakota, but as far as published no account of it. This may be the site mentioned above.

Tradition among the Hidatsa locates an early village on Graham's Island in Devil's Lake, but a careful search by Mr. H. C. Fish, when connected with the North Dakota Historical Society, failed to disclose any trace of such a site.

In preparing this list of sites we have given the definite or probable identification of a particular tribe with each village site so far as possible. There are, however, a number of sites not definitely ascribable to any one tribe, so far as history and tradition go. Tradition is in too many cases vague, one narrator locating a given site at one point, another connecting the same story with another site. This is more especially true of the older sites, and it seems certain that some archaeological features would present the surest means of identification. We know that some of the sites have been used by more than one tribe, and it is reasonable to suppose that this may have occurred in other cases.

The Arikara sites seem to predominate lower down the river, the older Mandan sites center in the Heart River region, while the Hidatsa sites are most numerous farther north near Knife River.

There are several much discussed and well-known sites which seem very difficult to identify. Among these are the site away from the river visited by the elder Vérendrye, the two Mandan sites on Apple Creek, the village of the chief, Looking, which is located at different points by different Indian informants, and the site of the original Dupla village, the head village of the east side people of the Mandan.

<sup>1</sup>It should be noted that the troops of Generals Sibley and Sully in their campaigns against the Dakota east of the Missouri, in 1863 and 1864, frequently threw up earthworks to defend their camps, sometimes on rather an elaborate scale, and these old earthworks might easily be mistaken for the remains of Indian villages by casual observers. These earthworks are described in the reports contained in The Official Records of the Union and Confederate Armies. Some Indian remains are also mentioned in these reports.

There seems to have been a real distinction between the Mandan of the east side and those of the west. We see the name Dup̄ta carried up river by this people and applied to several successive sites, and finally transferred to the west side at the Deapolis site of Ruptare or Dup̄tade when the last remnants of the east side people finally crossed the river. This division of the Mandan people is borne out by Maximilian's account of the difference in dialect between the people of the Fort Clark village and those of Ruptare.

The Mandan village names and organization seem to have been in some way bound up with the band divisions and band names. This presents an interesting problem. The present organization into seven bands, one division of four bands and one of three, seems to be a corruption of the older organization, perhaps due to contact with the Hidatsa. The older organization was made up of nine or thirteen bands, and the names of these divisions appear to have corresponded quite closely to the names given by Maximilian to the old Heart River villages.

We have stated some of the difficulties that are encountered in attempting to identify the village sites from traditional information: let us now see what aid archaeology promises in this task. In this archaeological field there are some differences in the remains, suggested by Dr. Libby, which in the better preserved sites are clearly demonstrable. These differences were partly established by Dr. Libby's examination of recent village sites, and are partly corroborated in the descriptions of the villages by the early explorers and travelers, and further established through the statements of the older Indians as given to Dr. Gilbert L. Wilson, Dr. Libby, and the writer. In view of the agreement of the testimony from all the various sources, it seems reasonable to accept the differences in question as definitely established.

According to this view, a village of the Mandan always contained at least one open area in the center of which was the barrel-like structure of planks—the ark of the First Man. All of the houses surrounding this open area belonged to prominent men and their doorways all faced more or less inward, without pointing directly toward the central point of the open space. One of the houses in this inner circle was distinguished by a peculiar method of construction, having a flattened front. No lodge was ever built in the open space, though caches and corn scaffolds might lie within it. These are the certain distinctive features of the Mandan village. Others have been suspected, but not demonstrated satisfactorily.

The Arikara village had an open space of similar proportions to that of the Mandan village, but lacked the plank cylinder in the center, and the Arikara sacred lodge always occupied a portion of the clear area.

The Hidatsa village, unlike the two above described, had no open area and no distinctive medicine lodge, the houses being crowded together throughout the village.

The Cheyenne earthlodge village has not been described by the early travelers or in tradition, and it can only be conjectured at present that it resembled most closely the Hidatsa village, as a comparison of the maps of village sites shows. We have therefore no distinguishing features for the Cheyenne site.

There is one other sure determining feature which does not have to do with the village plan. This is the form of burial, a certain means of distinguishing between the Arikara and the other tribes, since the former always buried underground while the other tribes of the region employed the scaffold or tree burial. The finding of bodies regularly buried in graves is therefore a safe indication of Arikara occupancy of a village site. On the other hand the finding of bundles of human bones, or pieces of human bones and skulls, scattered among the débris of a village site, is a safe indication of Mandan or Hidatsa occupancy.

In addition to the fairly well-established criteria of tribal differentiation mentioned above, there are a number of other points which further investigation may add to the list. Some stress has been laid in papers by other writers on the matter of the excavation for the house floor as a distinctive factor. As has been shown in a previous paper, investigation hardly bears this out, as various witnesses give different opinions and the safest conclusion seems to be that excavation was largely a question of getting a suitable soil for floor purposes. In this connection may be considered the question of the depth of house-rings. This feature might seem to depend on the amount of excavation, but investigation seems to show that this is not the case, as we find the deep rings in the sites traditionally longest occupied, no matter which tribe occupied them, and more especially if such sites are partially sheltered from the blowing and drifting of dust and sand. In the other words, deep house-rings are the result of the building up of the surrounding village level during long years of occupancy, and of wearing down the floor by treading and daily sweeping rather than of excavation for the floors.

Other points which at various times have been suggested as distinguishing features are the location with respect to each other of the wall and the ditch, the shape of the village area, the interior house arrangement, method of roof building, location of shrines or monuments of a sacred character, and lastly, differences in pottery and in flint and bone artifacts.

Considering the above points in turn: as regards the wall and ditch, the descriptions of early travelers and the examination of sites show in some cases the wall inside the ditch, while in other instances it is outside. To the present, however, no connection has been established between the location of the wall and the identity of the tribe that occupied a village site. Local conditions would seem to account for the varying location of the wall, though it is significant that the older sites seem to have had the wall inside, as described by the elder Vérendrye.

As to the shape of the village area: it is certain that there are no manifest differences between the shape of the Mandan and Hidatsa village sites. Mr. Steinbrueck, however, has advanced a theory that Arikara sites may be determined by their shape, which he says is always more or less circular, with a wall all around, and with salients at regular intervals. The writer has observed several such sites, but has also seen supposedly Arikara sites not built in this fashion and has observed known Mandan sites in the same form.

As to interior house arrangements: differences such as we know existed here, and in the forms of corn scaffolds, sweatlodges, etc., are not of a nature to leave any definite archæological trace, and therefore must be disregarded in seeking for factors of archæological differentiation.

As to the difference in the method of building the roof and lodge, there were doubtless minor variations between the methods of the Mandan, Hidatsa, and Arikara, but it is unlikely from what we know of these differences that they would leave archæological evidence. There is, however, an old Cheyenne tradition extant which mentions that the Cheyenne earthlodge of early times was built by burying the butts of long poles in a circular ditch, then bending the tops together and tying them there. Such a widely variant method would most certainly be plainly discernible by excavation, and if this method was really employed, as can be proved or disproved at known Cheyenne sites, would give us another easily recognizable factor for determination.<sup>1</sup>

As to the location of shrines or monuments of a sacred character pertaining to particular tribes, we have already mentioned the sacred lodges of the Mandan and Arikara, and the Mandan plank enclosure. In addition to these we have the 'Sun Mound' so-called, at the Cannonball site, described by the Dakota as a special Mandan feature. Evidence in

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<sup>1</sup>This type of earthlodge was not necessarily built by the Cheyenne in their Missouri River villages, for the tradition clearly refers to a much earlier period when the tribe lived in the country north of the Missouri, in Minnesota or eastern North Dakota. The Cheyenne, when they lived in this region near the lakes, built houses of poles covered with mats, the poles presumably being bent together at the tops and tied as above described. Later, seemingly when they moved into the plains north of the Missouri, they built the same type of house but covered it with skins instead of mats; they also built 'dug-outs' as above described.

this matter requires much elaboration before the presence or absence of such a mound can be used as a very definite factor.

Last we come to the matter of bone and stone artifacts, and pottery. Among these objects probably lies the best field for working out tribal occupancy of the different sites. A large amount of study, however, would be required to establish definitely the types of artifacts attributable to the several tribes. With a careful period of work elaborated by drawings and photographs, such as are given in "The Mandans," upon a known site of each of the tribes, it seems almost certain that clear differences in pottery design, shape of arrow points and bone implements, and quality of workmanship, could be demonstrated. Up to the present, however, this field of work is not open to the student. Let us hope that some organization may give us a definite report on at least one known site of each of the tribes, based upon careful excavation, so that we may have the much needed data for comparison.

*Steinbrueck's List.* After the above was in manuscript, there was discovered in the vaults of the North Dakota Historical Society a list of sites with their location by section and township made by Mr. E. R. Steinbrueck during his connection with the Society. This has been very courteously placed at our service by the Curator, Dr. Melvin R. Gilmore. The list locates forty-two sites, all of which have been carefully compared with our own list, and it is found that Mr. Steinbrueck lists nine sites not contained in our previous list. His list is given, herewith, numbered according to his system. His numbers 6, 17, 19, 22, 23, 24, 42 and 44 are not included in our list.

Of these new sites numbers 16 and 17 are located a short distance north of Fort Rice postoffice. Number 19 is located a short distance northwest of the present village of Huff.

His numbers 20 and 39 seem to be very nearly the same location unless the description is inaccurate, both approximating the Sperry site.

Numbers 6, 22, 44, 23 and 24 are located in a section where we had been unable to find any sites, that is, between the mouth of Square Butte Creek and the north side of the Square Buttes, 6, 22 and 44 being very close together and just north of the creek. It is possible that they have been plowed up recently.

Number 42 is located to the southwest of Mandan on Heart River and coincides with information obtained by Dr. Gilbert L. Wilson from an old Mandan, Butterfly. Butterfly said that the Fort Lincoln and Motsiff sites were Mandan and that the first Hidatsa village founded was up Heart River from the Motsiff site a short distance.

In publishing Mr. Steinbrueck's list, his numbers are given together with our own names for such sites as are included in our list.

Mr. Steinbrueck had the advantage of working at a time when there was little settlement over most of the region and not much plowing had been done. He was a careful worker and there is little doubt but what the additional sites which he gives were located as described.

Mr. Steinbrueck's list follows:—

1. NW 1/2 NW 1/4 Sec. 5 and NE 1/2 NE 1/4 Sec. 6, Twp. 137, R. 80 (Badwater).
2. Partly on NE 1/4 SW 1/2 and partly on lots 3 and 4, Sec. 13, Twp. 138, R. 81 (Fort Lincoln).
3. N 1/2 and S 1/2 SW 1/4, Sec. 35, Twp. 139, R. 81 (Motsiff).
4. SE 1/4, Sec. 27, Twp. 139, R. 81 (Scattered Village Site).
5. Part SE 1/4 SW 1/4 and part Lot 1, Sec. 33, Twp. 140, R. 81 (Otter Creek).
6. Center of S 1/2 Sec. 6, Twp. 140, R. 81 (a new site).
7. SW 1/4, Sec. 32, Twp. 143, R. 81 (Pretty Point).
8. SE 1/4, Sec. 30 and NE 1/4, Sec. 31, Twp. 143, R. 81 (Lower Sanger).
9. SW 1/4, Sec. 19, Twp. 143, R. 81 (Upper Sanger).
10. NE 1/4, Sec. 6, Twp. 143, R. 83 (Fort Clark Town site).
11. NW 1/4, Sec. 37, Twp. 144, R. 84 (Old Fort Clark historical village).
12. Four to five miles below Fort Yates, Cheyenne.
13. Two miles above Fort Yates at second Day School (Slob Town Cheyenne).
14. Center of S 1/2, Sec. 10 and N 1/2, Sec. 15, Twp. 134, R. 79 (Cannonball).
15. Lot 3, Sec. 14, Twp. 135, R. 79 (Fort Rice).
16. E 1/2 SW 1/4, Sec. 11, Twp. 135, R. 79 (a new site).
17. E 1/2 NW 1/4, Sec. 11, Twp. 135, R. 79 (a new site).
18. Center N 1/2, Sec. 8 and S 1/2, Sec. 5, Twp. 136, R. 79 (Huff).
19. SW 1/4, Sec. 5 and SE 1/4, Sec. 6, T. 136, R. 79 (a new site).
20. NW 1/4, Sec. 14, Twp. 139, R. 81 (Boley).
- 21.
22. SW 1/4, SW 1/4, Sec. 6, Twp. 140, R. 81 (a new site).
23. Part NW 1/4 and part NE 1/4, Sec. 14, Twp. 141, R. 81 (a new site).
24. N 1/2 SW 1/4, Sec. 14, Twp. 141, R. 81 (a new site).
25. NE 1/4, Sec. 17, Twp. 142, R. 81 (Molander).
26. SW 1/4, Sec. 31, Twp. 143, R. 81 (Smith).
27. NE 1/4, Sec. 36, Twp. 144, R. 82 (Hensler).
28. SE 1/4, Sec. 26, Twp. 144, R. 82 (Greenshield).
29. SE 1/4, NE 1/4, Sec. 34, Twp. 144, R. 83 (Mandan Lake).
30. Center where 6 and 7 of Sec. 16 and NE 1/4 and NW 1/4 join Sec. 21, Twp. 144, R. 84, (Deapolis).
31. S 1/2, Sec. 17, Twp. 144, R. 83, New or meant for 84—lost site, destroyed by railroad.
32. Sec. 33, Twp. 145, R. 84 near mouth Knife River, Stanton (Amahami).
33. NE 1/4, SE 1/4, Sec. 33, Twp. 145, R. 84 (Lower Hidatsa).
34. NE 1/4, NE 1/4, Sec. 33, T. 145, R. 84 (Lower Hidatsa).
35. Near center, NW 1/4, Sec. 21, Twp. 145, R. 84 (Big Hidatsa).



- 36.
37. S 1/2, NE 1/4, Sec. 30, Twp. 136, R. 78 (Shermer).
- 38.
39. NW 1/4, Sec. 2, Twp. 139, R. 81 (Sperry).
40. NE 1/4, Sec. 21, Twp. 140, R. 81 (Burgois).
41. Part NW 1/4, Sec. 9 and SE 1/4, Sec. 4, Twp. 140, R. 81 (Larson).
42. NE 1/4, NE 1/4, Sec. 33, Twp. 139, R. 81 (a new site).
43. NW 1/4, Sec. 10, Twp. 136, R. 80 (Eagle's Nose).
44. Lot 7, Sec. 34, Twp. 141, Range 81 (a new site).

#### SURVEY OF VILLAGE SITES IN 1919.

In conclusion are given some details from a survey made in 1919 in conjunction with Dr. Spinden, a survey which included all of the known sites on both sides of the Missouri from the Cannonball site to the Burgois site. This area included all of the older sites to which but little attention had previously been given; none of the actual historical sites were visited.

Fourteen sites were examined, and all were mapped where sufficient trace remained for mapping to be possible. Small representative collections of pottery and other artifacts were sought at each site from which some rather interesting data have since been derived. The sites visited were for the most part the very oldest ones which can be connected up with the Mandan, and which traditionally mark the earliest advent of that people into the region. The following list names the sites seen in order going upstream:—

The Cannonball site, the Fort Rice site, the Shermer site, the Glencoe site, the Huff site, the Eagle's Nose site, the Holbrook site, the Bad Water site, the Fort Lincoln site, the Motsiff site, the Ward Site, the Sperry site, the Boley site, the Burgois site.

These sites have all been described or mentioned previously, with one or two exceptions, but we shall give a brief account of them as observed on this survey, taking them up in turn.

*The Cannonball Site.* (No. 14.) This site was gone over rather carefully. It was found that much of the area previously supposed to belong to the site gave no evidence of it on close examination. Even with this lopping off, however, the site is a large one. It was mapped as well as possible, in view of the fact that part has been plowed, and all is rather indistinct. There is rather clear evidence of two series of house rings, one much more plainly marked than the other, and superposed upon it. The rings do not seem to be crowded even under these conditions. Some difficulty was experienced in getting a collection of artifacts, most being found in the section which was occupied by a patch of corn. This

scarcity of artifacts may be due either to short occupancy or to extreme age which often operates to make finds of that sort procurable only at a considerable depth. Some fifty-six pieces of pottery were secured in all, most of which were noticeable for their coarseness and lack of ornamentation.

*The Fort Rice Site.* (No. 15.) This site is at present almost indistinguishable, having been so many times plowed and seeded, a slight rolling of the surface being about the only evidence to show house rings. Pottery and artifacts were scarce, but a small collection was gotten after some search. All rim pieces found showed decoration and the quality seemed superior to that of the Cannonball site. Quite a proportion of the sherds were red.

*The Shermer Site.* (No. 37.) This site on the east side of the river has been known for some time, but never described by anyone who had visited it. It proved to be very interesting. With the exception of a small corner which has been plowed and was occupied by growing corn at the time observed, the site is in very good condition and was easily mapped. It is some three miles south of Glencoe, North Dakota, in a rather rough country with several bad-land buttes in the vicinity, and far removed from general travel. The site lies on the edge of a rather low bench with a broad view over the river bottom to the west. It is bounded on the north by a shallow coulée and overshadowed on both the north and south by higher bluffs. This site is one of those in which bastions play a part in the fortifications. A wall and ditch seem to have surrounded the whole site except along the bench edge and the wall projects at intervals into well made bastions. The house rings are fairly close together though not crowded as in some of the later sites. (Fig. 11.) The amount of pottery and artifacts present and easily dug up would indicate a rather lengthy period of occupancy, as would the depth of deposit in places along the bench edge. 123 potsherds were found together with a number of bone and stone articles. The pottery was of good quality with nearly all rims showing ornamentation. About one-fifth of the sherds were red or brown.

*The Glencoe Site.* About two miles above the Shermer site on the edge of a high bluff with deep coulées both above and below, very indistinct traces of another possible site were discovered. The site has apparently been cultivated for some time. At present there are no indications of house rings or boundaries, except in the fading off and disappearance of artifacts. Doubtless this site was only a temporary one, although enough potsherds were found to show that it was more than a camp en route.

The pottery seems to resemble very closely in its general characteristics that of the Shermer site.

*The Huff Site.* (No. 18). This site proved perhaps the most interesting of any visited, especially because it is in the very best-preserved condition of any of the extra ancient sites, never having been plowed or materially disturbed. Some of the other nearby sites may have presented as inter-

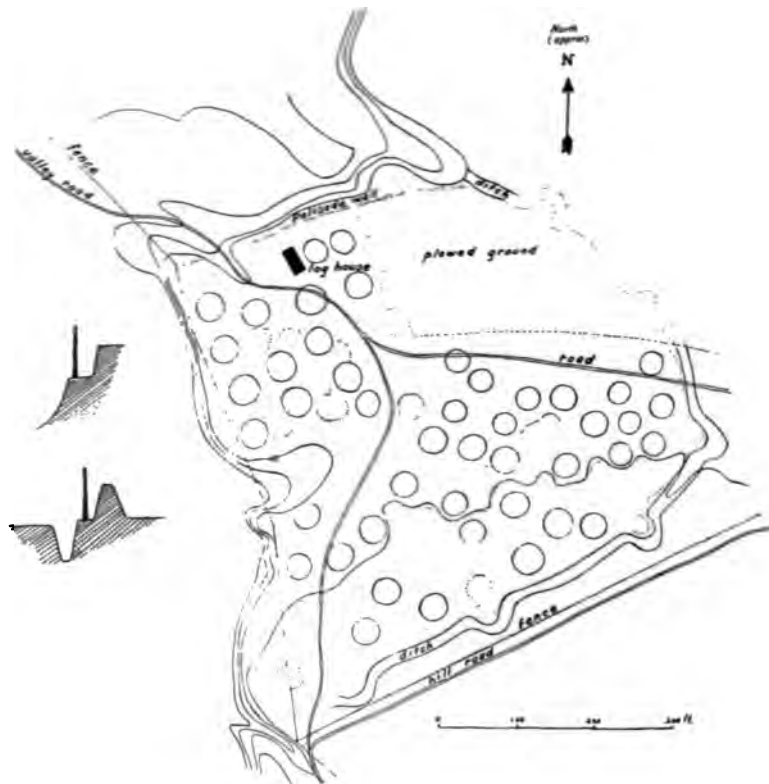


Fig. 11. Shermer Site (No. 37 on map), showing Detail of Wall and Ditch and of Palisaded Bluff.

esting and unusual features, but they are now so nearly obliterated that it is impossible to tell. The map made showed many features which differentiated this site from any of the others, the most prominent feature being its almost perfectly rectangular shape. The rectangle lying along the high bluff overlooking the river is well outlined by a wall and ditch, still of considerable depth, with a number of regularly placed

bastions. The river side is protected only by the very precipitous bank. An area of about twelve acres is enclosed within the wall, making this perhaps the largest enclosed site we have found. (Fig. 12). Most of this site is owned by the North Dakota State Historical Society.

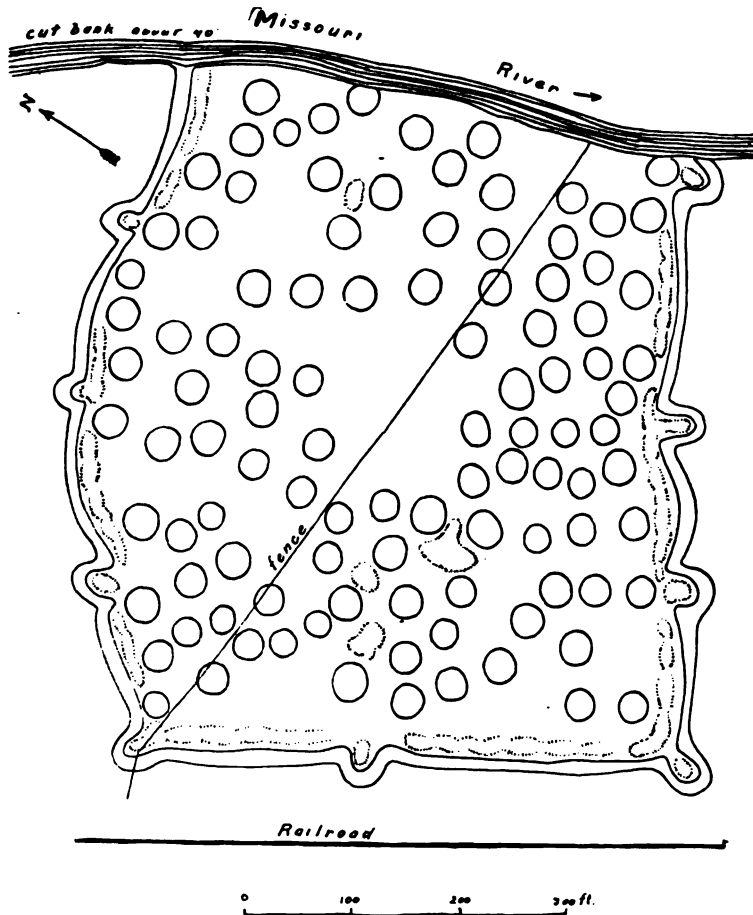


Fig. 12. Huff Mandan Site (No. 18).

A coulee cuts into the bluff a short distance beyond both the north and south ends of the site. A bastion occurs at each corner as well as those at regular intervals along the three sides. Within the wall, the ground now is comparatively level, although the house rings are easily

distinguishable. Apparently the site has drifted in with sand and dust, as very little trace of occupancy can be found without digging well down beneath the present sod. The house rings are spaced much further apart than usual and seem to be laid out more or less in lines or rows with linear areas that might pass for streets. Pottery found here seems to resemble strongly that from Fort Rice, and the Shermer and Glencoe sites, although it was much more difficult to find in quantities since none of the area had been plowed. In connection with the unusual features of this site, it is interesting to recall its traditional importance. Supposedly this is the site of the first village built by the culture-hero chief, Good Furred Robe, when the Mandan reached this vicinity. One Mandan tale relates that the site was laid out with straight lines, the houses more or less in rows, to imitate the laying out of a field of corn, all as directed by the chief. A number of the oldest stories are also connected up with this and the Eagle's Nose sites.

*The Holbrook Site.* (No. 46.) This site has been referred to previously, and described some years ago in a paper for the "Anthropologist." The description at that time is as follows:—

The site extends along the bluff about twelve hundred feet, the depth back up the gentle slope being about six hundred feet. A ditch ran from the north end of the village on the edge of the bluff in a flattened semi-circle to the south end where it terminated at the bluff edge which is quite steep all along here. The ditch was traceable for the whole distance and the larger mounds seemed to skirt the inner side of the ditch, with lower mounds and barely distinguishable depressions in the enclosed area.<sup>1</sup>

Since the above was written all traces of mounds, ditch or rings have disappeared, but no great difficulty was experienced in finding a good collection of potsherds and other artifacts. It will be noted from the description above that this was a very large site which may originally have closely resembled that at Huff, as even when first observed long cultivation had destroyed most of the details of construction.

*The Eagle's Nose Site.* (No. 43.) Our next site is the unusual one of Eagle's Nose on the west side of the river. This has already been described, and is almost directly across from the Holbrook site. Artifacts of any sort seemed to be pretty far below the sodded surface here and some trouble was experienced in getting pottery fragments; in fact what was found was for the most part only of the heavy, crude and lasting type.

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<sup>1</sup>Will, G. F., "Some New Missouri River Valley Sites in North Dakota" (*American Anthropologist*, N. S., vol. 12, pp. 58-60, 1910), 59.

*Bad Water Site.* (No. 1.) This site on the west side is located about a quarter of a mile above Little Heart or Bad Water Creek of the Mandan. The location is on the gentle slope of a hill which descends to the low bluff edge. Unfortunately it has been practically destroyed, part having been frequently plowed, part being occupied by a wide graded road, and most of the rest effaced by a wide railroad cut. About all that could be done was to secure a small collection of pottery and artifacts. Apparently this also was a site of considerable area and would have been very interesting for comparison with that at Huff and the Holbrook site. This site is mentioned frequently in Mandan traditions.

*Fort Lincoln Site.* (No. 2.) About five miles further up we come to the well-known and important site of old Fort Abraham Lincoln. This has been previously described. On this occasion it was mapped, and a good collection was obtained. The deposits of debris are very deep here and long occupancy until rather more recent times than in case of the sites lower down is suggested by the fact that artifacts are plentiful even on the surface, and the ground is only partially sodded over. (Fig. 1.)

*Motsiff Site.* (No. 3.) Three miles further up, and again on the west side is another well-preserved and apparently long occupied site. Some traditions give this as the seat of the Hidatsa while living in this area, while others call it an offshoot of the Fort Lincoln Mandan site. It lies on the point of a bench some thirty feet above the bottomland and along the base of which Heart River flows. It is cut or perhaps bounded on the west by a deep ravine, a point somewhat difficult to determine. There are traces of a wall and ditch; the house rings are of unusual depth; and there are a number of very large mounds scattered over the village site. This site, with the Burgois, Boley, and Larson sites, seems to be of a very similar type and appearance. The site was mapped and a good collection of pottery and artifacts found, as they were rather plentiful. (Fig. 13.)

*The Scattered Village Site.* (No. 4.) This site is situated in the eastern part of the city of Mandan, is entirely built over or occupied by gardens, and is practically destroyed.

*The Ward Site.* (No. 47.) The next site is on the east side. It has already been mapped and described. Particular attention was however, directed to the bastion in view of the occurrence of this feature further down. In this case, a wall and ditch cut off a promontory of considerable height and inaccessibility, these being on the east and including two bastions very similar to others observed. The ditch extends out onto the steep sides of the promontory as a sort of terrace. A good collection

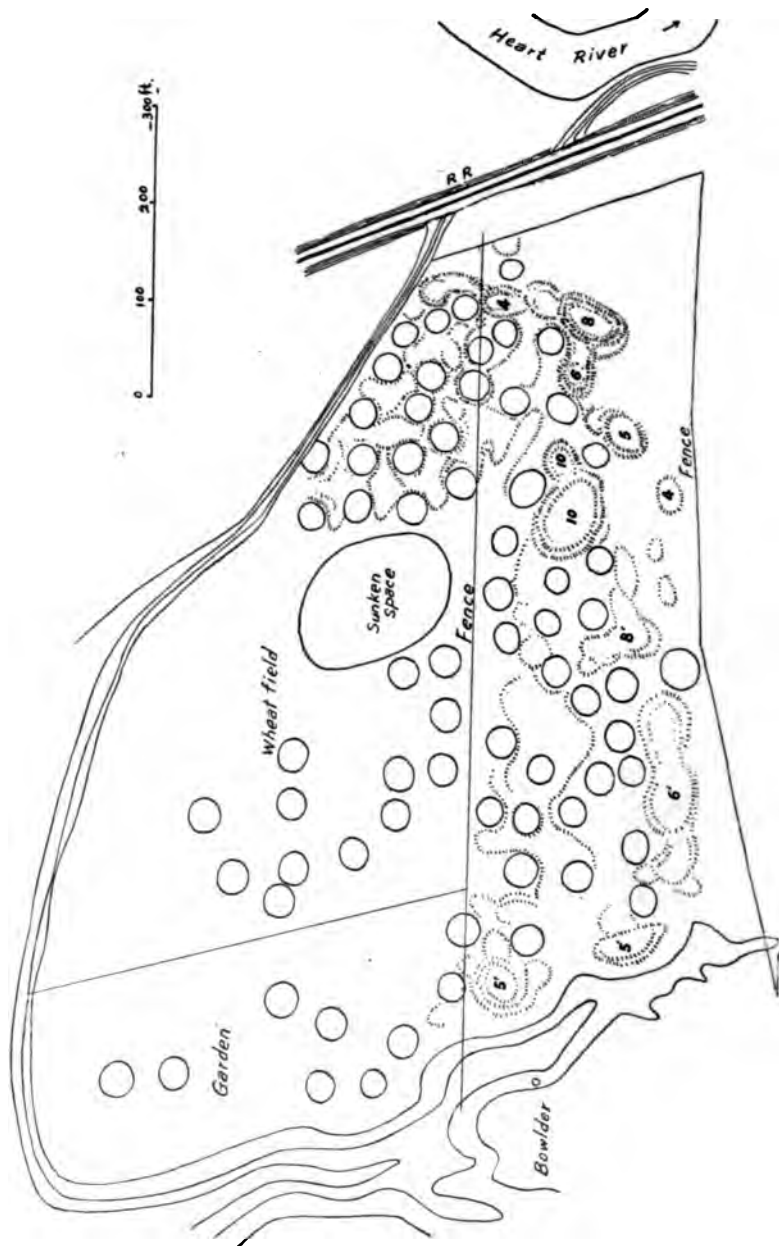


Fig. 13. Motaiff Mandan Site (No. 3).

was secured here, although it was necessary to go below the sod to find anything.

*The Sperry Site.* (No. 39.) Four miles further up on the same side is the Sperry site, located on the point of a high bluff where Burnt Creek enters the Missouri River bottoms. The creek flows along the east and north base of the bluff while the river bottoms are along the west base. This site differs somewhat in general appearance from others in the region. It is rather faint in places, but appears to show a ditch and wall across the narrow neck of the promontory, with the ditch continued as a terrace for some distance along the east side. The site was mapped and a good collection of pottery and artifacts taken without much difficulty. A significant feature was the easy discovery of several glass trade beads upon the ant hills. This is the only site in the region in which evidence of contact with the whites has been found. It would serve perhaps to fix the site as more recent than others in the region, and renders significant a claim by an Arikara that it was built by his people.

*The Boley Site.* (No. 5.) Almost directly across the river from the Sperry site is the Boley site, already described. A map was made at this point although part of the site is obliterated by a railroad cut. A good collection was also made here with great ease as pottery and artifacts were very plentiful.

*The Burgois Site.* (No. 40.) This site has been better described and more frequently mapped than any of the others. Only a short time was spent here in getting a small collection of potsherds.

#### CONCLUSION.

In pursuing the above-described work an impression gradually grew up that there were two rather distinct types of sites in the region, distinct enough in fact so that nearly every site could be referred readily to one or the other group. The center for one type seems to be below the Heart River, with the Huff site as perhaps the best representative. The second type is found at and above the mouth of the Heart River altogether, although the lower sites seem to overlap. A basis of racial difference seems hardly practicable as sites of both types can, with little question, be attributed to the Mandan. A reasonable conclusion therefore seems to be that the two types must represent a difference in time and culture between two periods of occupation by the same tribe. This agrees well with the historical traditions of the Mandan, and seems a fair hypothesis although much longer and more detailed work would be required to demonstrate it fully.



As to the actual differences, the descriptions and maps will give some of them, but unfortunately many of the very old sites were beyond mapping. In our pottery collections, however, there seems to be an opportunity for the working out of pronounced differences which seem to go with the two types of sites. The collections were not sufficiently large to get at many differences, but one at least seems to be pretty clearly shown.

The differences which we believe to be shown by a general examination of the sites are as follows: The lower or older sites are more heavily grassed over when undisturbed, artifacts are almost impossible to find until a thick layer of sod has been removed, whereas on the upper sites the sod is thin or absent and many artifacts are present on the surface. In the older sites the area is much larger for the same number of house-rings, the rings are spaced further apart, the area is more level with only low mounds occurring occasionally, the carefully planned wall and ditch with bastions occur with the exception of the Molander site only in the lower territory where we find three marked examples of it with most of the other sites too nearly obliterated to show whether this feature was present at all. The examples are the Shermer, Huff, and Ward sites. As to the Molander site, in many features it seems to resemble the older group and it may have been built by a pioneer group from the older villages. The Huff site is a wonderful example of well worked out fortifications, and unquestionably antedates any possible white influence. In connection with this feature of fortified villages with bastions it is interesting to recall Vérendrye's descriptions of such features at the Mandan villages.

As has been said, differences in pottery seem to agree with the ones enumerated above. Other artifacts seem to be pretty much the same for all sites and do not occur in such quantities as does the pottery. Some difficulty was encountered in working out a graphic plan for showing the difference in pottery as nothing but small fragments were secured from any site. However, a rather arbitrary plan of tabulation was worked out which seemed fairly satisfactory, and which at least brings out one difference very clearly. It is possible that with much larger collections a number of other very interesting features could be worked out. As our collections varied much in numbers of pieces only broad and unmistakable features could be differentiated.

The plan used is the tabulation of all pieces from each of the different sites according to a list of specific features of decoration, quality, etc. The following features were selected for tabulating: the number of red

or brown and black pieces from each collection; the number of plain, unornamented rims from thin ware; the number of plain, unornamented rims from thick ware; the number of pieces showing exceptionally fine and skilful work; the number of pieces showing incised herring-bone pattern decorations; the number of pieces showing fingerprint ornamentation; the number showing decorative ears, knob or lugs on the rim; the number showing decoration by pressing something resembling a string of flat beads into the wet clay; the number showing a decorated border around the top of the pot; the number showing the rim itself decorated as well as the border; the number with outside and inside decorated border, the number showing outside and inside border and rim, all three decorated; the number showing the string mark decoration widely spaced; and the number showing these string marks spaced closely together.

The table worked out from collections from the fourteen sites is given herewith.

Site	Red	Black	Plain thick rim	Plain thin rim	Herring-bone pattern	String lines close	String lines wide	Ears	String decorated edge	String edge and border	String edge, border and inside	Finger mark decorations	Very fine	Only body decorated
Cannonball	7	49	8	0	0	0	3	0	4	0	0	3	0	2
Fort Rice	12	14	0	0	0	0	6	1	2	0	0	3	0	6
Shermer	25	98	17	1	3	0	14	1	11	0	0	14	3	15
Glencoe	20	63	0	2	5	2	8	1	9	1	0	2	4	9
Huff	5	32	1	0	1	0	11	0	1	0	0	1	0	11
Eagle Nose	3	60	13	0	0	1	14	2	3	3	5	3	1	7
Bad Water	5	59	7	7	1	0	11	2	2	0	0	16	0	11
Holbrook	7	23	0	0	0	3	17	1	5	1	1	0	2	10
Ft. Lincoln	46	115	4	2	18	32	16	0	5	14	1	19	6	36
Motsiff	2	19	4	2	2	8	1	1	1	1	4	2	1	6
Ward	20	151	1	0	2	11	37	2	1	0	0	7	0	41
Sperry	2	53	8	0	1	22	1	1	10	1	1	1	3	9
Burgois	9	32	11	0	1	14	2	2	3	3	2	4	2	5
Boley	21	115	17	8	5	35	6	1	12	2	2	2	1	29

String ornamentation is, of course, the predominating method used in this region and hence most of our differentiation is based upon variations in that feature. A glance at the table shows that the single feature which shows marked and certain differences between sites is that of widely or closely spaced string-mark lines. Not only is this

difference pronounced between sites, but also between groups of sites which coincide with the groups as determined by other data. The sites grouped as the lower and older are the Cannonball, Fort Rice, Shermer, Glencoe, Huff, Eagle's Nose, Bad Water, Holbrook and Ward. The later or upper sites are Ft. Lincoln, Motsiff, Boley, Sperry, and Burgois.

The figures from the table demonstrate that all of the older sites have a very heavy proportion of the pottery with string marks with the lines widely spaced on the pot surface. On the other hand, we find the preponderance of pottery showing the narrowly spaced lines to be almost as great in the newer group of sites. The Holbrook and Ward sites, uppermost, and presumably latest of the older group seem to show more or less of a transition, the Holbrook site showing seven wide and nine narrow, the Ward showing thirty-one wide and fifteen narrow. Larger collections might change indications in the case of these two but could hardly be expected to do so in the cases of most of the other sites. Incidentally it must be noted that the Sperry site, indicated by some evidence as the youngest site, shows the greatest preponderance of the closely spaced line pieces.

An approximate total of the pieces in the collection from each site may be obtained by adding the number of red or brown and black pieces for each site.













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